ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

(Formerly Review of Telegraph and Telephone.

Vol. 6, No. 16. WEEKLY. | NEW YORK, SATURDAY, JUNE 20, 1885. | $3 per annum. Single Copies, 10 Cents.

Copyright, 1885, by ELECTRICAL REVIEW PUBLISHING COMPANY, 23 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

Electrical Fire-Arms and Cartridges.

The invention relating to electrical fire-arms and cartridges for the same, which we illustrate in this issue of the REVIEW, is the invention of Edgar A. Monfort, of New York, and is one that will attract widespread interest and prove of great value to the inventor. The base patents covering the invention are now owned by the Universal Electric Arms and Ammunition Company of this city. A public test was recently made at the United States Ordnance Department, at the Army Building in this city, of the Monfort Electric Gun, at which were present Mr. Frank H. Gray, the president of the company, General Wm. F. Smith, General Silas Crispin, chief of ordnance, Major McGowan, U.S.A., Mr. Fred. M. Kelly, and many others, at which time the electric gun was prononnced a perfect success, and secured the highest encomiums from all present, including Colonel Crispin, who is probably the most noted gun expert in this country.

This invention is applicable more especially to breech-loading fire-arms, muskets, fowling pieces and pistols, as well as to all sizes and kinds of cannons, howitzers, mitrailleurs, etc. It consists of a fire-arm in which the charge is ignited by an electrical current passing through a platinum wire connecting the terminals of two conductors which are passed into the powder within the cartridge. In this invention is provided a galvanic battery, or preferably a well-charged storage battery (or a suitable dynamo-machine or other source of electricity may be used), connected by its conducting wires to contact points or contact surfaces which are exposed in the cartridge chamber of the arm. In one of said conducting wires is a break and a button, or other means analogous to a trigger, for closing the circuit at that point when desired by an easy movement of the finger. There is also provided another means of opening and closing the circuit to be set with the circuit open under ordinary circumstances as a safeguard against accidental discharge. The cartridge is provided with two conducting wires which lead from the exterior into the powder charge, where they are connected with each other by means of a very fine wire of platinum or other suitable material or metal having considerable resistance so as to become heated by an electric current. The contact surfaces, in which the conducting wires from the battery terminate, are so arranged that as soon as the proper manipulation is effected, an electric contact is established with certainty through the conducting wires of the cartridge. The electric circuit may be closed by pressing the button, analogous to a trigger, the electric current traversing the platinum wire in the charge of the cartridge heats said wire to a high degree and thus ignites the charge instantly. In the illustrations is shown the invention as applied to a musket; also several cartridges embodying in various forms those features of the invention which relate to the ammunition. Fig. 1 is a section of a part of a musket constructed according to the invention; Fig. 2 is a corresponding plan view; Fig. 3 is a front view of the hinged breech block detached; Fig. 4 is a longitudinal section through such breech block; Figs. 5, 6, 7 and 8 represent cartridges; Fig. 7 shows a cartridge intended more particularly for fire-arms which contain the general mechanism of what are known as "needle-guns"; Figs. 9 and 10 represent respectively parts of the cartridges 6 and 8 detached. Similar letters of reference indicate corresponding parts in all the figures. *A* is the butt of an arm hol lowed out to receive a storage or other battery, generator or source of electric energy *B*. One pole of said battery is connected by the wire *b* to a conductor carrying a spring *C*, which, when the parts are adjusted for use, form electrical contact with a central contact pin *K*, set in the breech block *H* of the piece in line with the axis of the barrel, and exposed in the cartridge chamber. This pin *K* and conductor *C* are insulated from all the other metallic parts of the piece by a sufficient thickness of hard rubber or other good non-conducting material.

The other pole of the battery *B* is connected by means of a wire b^1 to a contact, spring *D*, provided with a push button D^1 or other suitable device by means of which it may be pressed in contact with the plate *E*, which connects to a metallic part of the gun; for instance, to the bolt *F*, which unites the breech *G* to the butt *A*. A contact ring *M*, of annular form, is set in the breech block *H*, in metallic contact with the latter and concentric with the pin *K*.

The contact between *C* and *K* is controlled by turning the spring *C* on its pivot or center, as will be obvious. It may have two notches, which are pressed by the force of the spring against the edge of a plate, so that one notch or the other is certain to be engaged therewith, and to hold the spring in that position until it is intentionally changed to the other notch. In one position of the spring the circuit is positively broken, so that the piece cannot be discharged however the button D^1 may be operated. But when the piece is about to be fired, the operator first turns the spring *C*, and causes it to engage by its other notch. This closes the contact between *C* and *K*. Then, so soon as the button D^1 is operated, the circuit is completed and the cartridge is fired.

O is the cartridge, having its rear or bottom, *Q*, of wood or other non-conducting material. Through the center of the bottom *Q* extends a conductor *P*, and a similar conductor P^1 extends through the bottom *Q* near its periphery. Each of these conductors is composed of a series of fine wires twisted together. The inner ends of the wires *P* P^1, in the powder chamber, are connected with each other by means of a very fine platinum wire *R*. The other ends of the wires *P* P^1 project slightly beyond the surface of the

FIG. 1.

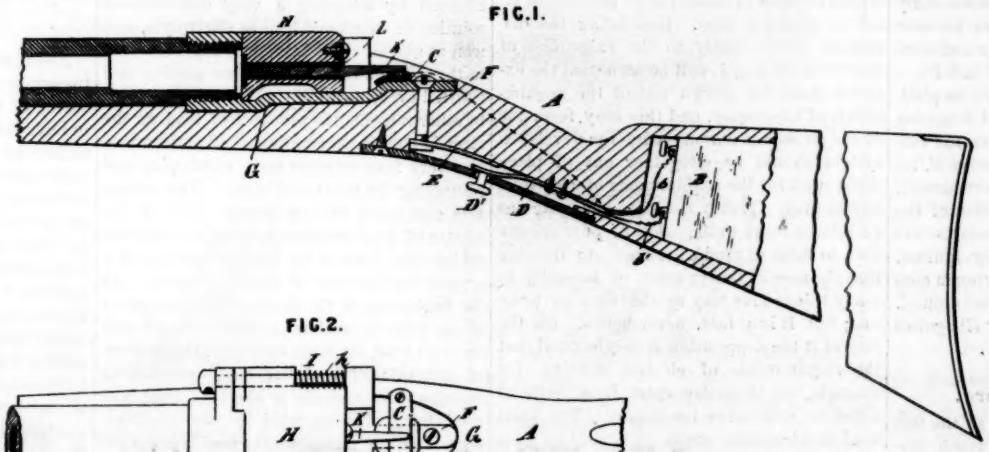


FIG. 2.

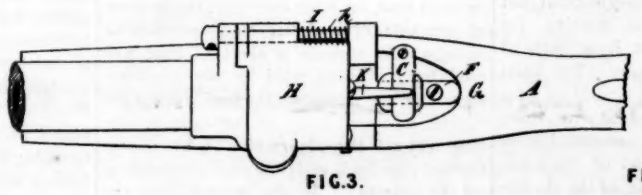


FIG. 3.

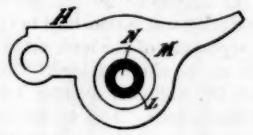


FIG. 4.

FIG. 5.

FIG. 6.

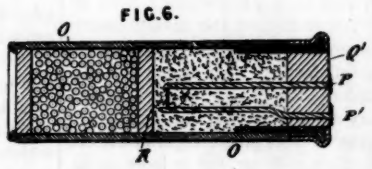


FIG. 7.

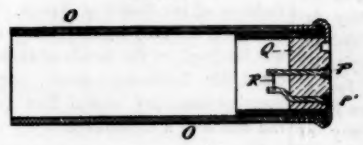


FIG. 9.

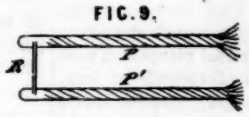


FIG. 10.

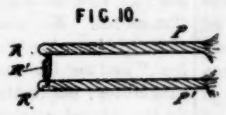
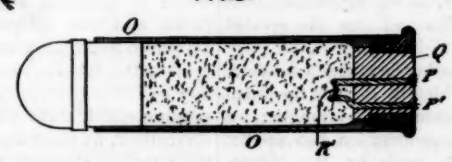


FIG. 8.



ELECTRICAL FIRE-ARMS AND CARTRIDGES OF THE UNIVERSAL ELECTRIC ARMS AND AMMUNITION COMPANY. NEW YORK OFFICE, 202 BROADWAY.

bottom Q, and are spread as shown, so that when after the insertion of the cartridge the barrel is closed by turning the breech block H down on the pivot I, the spread ends of said wires P P^1 are pressed by the elastic force of the several fine wires against the contact surfaces M and N, ensuring a good contact.

In Figs. 5 and 6 is shown a cartridge with a metallic bottom, in which is inserted a plug Q^1 of non conducting material, through which wires P P^1 are inserted in substantially the same manner as described, the inner ends of said wires being connected by means of a platinum wire R.

Fig. 7 shows a cartridge more particularly adapted for what are known as "needle guns," and especially for magazine guns. In this is formed in the bottom of the cartridge a central depression, and also an annular depression surrounding the former, and set the wires P and P^1, so that they project beyond the bottom of these depressions respectively, but do not project beyond the general surface of the bottom of the cartridge, it being desirable to leave said surface without any raised parts. The nose-piece, or forward end of the bolt of the gun, is correspondingly formed with a central pin and an annular sleeve, insulated from each other and conducting the current to the wires P and P^1.

Fig. 8 shows a cartridge in which the platinum wire R is encircled by a spiral wrapping of gun cotton R^1. This increases the certainty that the heat in the fine wire R, induced by the passage of the electric current, will immediately ignite the powder of the cartridge so soon as proper contacts are made. Gun cotton is very readily ignited, and its fibrous nature ensures its lying in contact with the wire when it is wrapped around. The explosion of the gun cotton R^1 ignites the powder.

Notation and Nomenclature.

The paper read and discussed at the last meeting of the Society of Telegraph Engineers will probably prove of some historic interest, inasmuch as it has compelled the Council to change their usual attitude of meditation for one of action. Some three or four years ago the suggestion was made to the Council of Telegraph Engineers that a committee should be formed for the purpose of considering the question of Electrical Notation and Nomenclature, but, as is usual in England when an initiative is to be taken, the suggestion was quietly shelved. From time to time since that period, the question has been mooted in our columns and in the columns of our contemporary, the *Engineer*. M. Hospitalier, in France, and Messrs. Munro and Jamieson in England, working independently to provide pocket books for electrical engineers, became tolerably familiar with the chaotic state of electrical notation and nomenclature. M. Hospitalier may claim priority in action, for the formation of the "Commission des Notation Electriques," by the International Society of Electricians, is due almost entirely to his energy and perseverance. This Commission has considered the question, and has drawn up an interim report, which at present is to a certain extent confidential; hence we can only refer to it in somewhat general terms The question has, we are informed, been considered not only from the standpoint of the requirements of the electricians of France, but from the broader basis of cosmopolitan requirements.

At the meeting of the Telegraph Engineers last week we were told that the Council of that body had agreed to the formation of a committee to report upon the question, and to consult with the French Committee in order that the whole subject might be satisfactorily dealt with—once and for all. Unfortunately we cannot suppose that the French Committee will agree to discuss the question *de novo*; hence it remains simply for the new committee either to accept what has been done, with, perhaps, a little tinkering for form's sake, or to construct a system of its own. In the latter case we should have before us the rival systems of England and of France, and the universal system would be relegated to the distant future. We can not help going out of the way to utter another protest at the general policy of the Society of Telegraph Engineers. The scientific position of England does not tolerate being constantly in the second or third rank; but this Society seems to rest satisfied with following and never leading. It should really represent the electrical voice of England, but it does nothing of the kind. In no one single thing does the Society take the rank it should take, and certainly would take if less timorous councils prevailed. To return to our immediate subject, Mr. Jamieson's paper is admirable as showing how simple it is to pull anything to pieces; but when we consider it as a constructive system in contradistinction to a destructive criticism, its value is not so great. The consideration of the question is not at all as simple as it looks In the first place, it may be asked, are we to assume without discussion that the C.-G.-S. system is acceptable? Of course this is the French system, and it is partly accepted by English scientific writers, although some writers do not accept the system, but prefer the M.-G.-S. system. We have yet to learn, however, which of these systems really commends itself to practical men. Restricting the discussion more closely to the exigencies of electrical science, it will be seen that the existing chaos has grown out of the requirements of telegraphy, and this may form one of the strongest reasons why the developed system should be altogether out of place when used for the requirements of electrical engineering. It may not be to our taste—as pertaining more to the ranks of pure science than to those of applied science—to imagine that the men of theory must of necessity in many things give way to the men of practice; but it is a fact, nevertheless. On the face of it the supposition is only natural that the requirements of electric lighting, for example, are altogether apart from those of aerial or submarine telegraphy. The units used in telegraphy apply to quantities of a very minute nature as compared with those of electric lighting The construction of dynamos will gradually go out of the hands of the electrician into those of the electro-mechanical engineer, who will suit his own taste and convenience as to the terms he uses; and unless a practical system in accordance with his views is adopted, he will create or import mechanical terms to satisfy his wants. The constructing engineer of the last new ironclad or Atlantic liner is not going to talk about the work developed in ergs, nor will the builders of dynamos in the near future be satisfied to follow the usage developed from telegraphic progress. We already find some makers designating their machines as of so many units, after the fashion of the Board of Trade. The units, however, adopted by the Board of Trade do not fare well in the hands of those who criticized Mr Jamieson's paper, nor should we imagine that they would fare any better in the hands of a committee.

Should, however, the adoption of the C.-G.-S. system be confirmed, it will be difficult for any committee to differ materially from the conclusions arrived at by the French Committee. We should agree with Mr. Jamieson in using C as a symbol for "current," and not I as suggested by the French Committee; but in tead of K for "capacity," we should prefer to follow the system adopted in chemical notation and use the symbol Cp., leaving C.P. to indicate "candle-power." There is another practical consideration which has evidently escaped the attention of Mr. Jamieson when arranging his symbols, and this consideration also applies to the suggestions made by Mr. Munro. Those who are best acquainted with the troubles and trials of printing will understand that the multiplication of signs means not only the multiplication of expense in adding to the immense number of symbols already in use, but multiplies the probabilities of error. It is at the present time very difficult indeed, no matter how careful men may be, to get a mass of symbols, mathematical or otherwise, put into type without some very grave errors. The expense attached to this class of work is greatly in excess of that of ordinary printing, and therefore in the construction of any system of notation, every effort should be made to introduce as few new symbols as possible, and those introduced should be of as simple a character as possible. It seems to us that the French Committee have not forgotten this point, and if we might venture the suggestion to the Society of Telegraph Engineers as to the formation of its committee, it would be that the names of several mechanical engineers and one or two practical printers be added to the committee, in order that questions which would not present themselves to an ordinary committee might be considered, and a more complete and practical system of notation and nomenclature devised.—*London Electrician.*

A New Secondary Battery.

At a meeting of the Society of Electricians and Telegraph Engineers, in London, held on the 6th March, Dr. Kalischer described a new secondary battery intended to overcome the disadvantage of the usual accumulators, namely, that the sheet of lead used as a node got very soon destroyed. This object he attained by adopting a very concentrated solution of nitrate of lead as electrolyte, and iron as anode. The iron, on being immersed in the solution of lead, became passive and resisted every corroding effect of the fluid, in other respects the peroxide of lead on the electric charge became deposited at the anode as a very firm coherent mass enveloping and protecting the iron on all sides. The charge was continued till the greater part of the nitrate of lead was decomposed, a condition which was marked by the occurrence of a greater development of gas at the anode. At the beginning of the charge all development of gas must be avoided, as otherwise the peroxide of lead, or, more correctly, the hydrate of peroxide of lead, became covered with bubbles. As cathode a sheet of lead was used, but it was attended by two disadvantages. In the first place the lead, during the charge, separated itself at the cathode into long crystal threads, which soon passed through the fluid, and produced short closing (of the current). In the second place the nitric acid, which remained in the fluid after the separation of the lead, acted very powerfully on the sheet of lead. Both disadvantages Dr. Kalischer avoided by amalgamating the cathode. This accumulator of iron, concentrated solution of nitrate of lead, and amalgamized lead yielded, after the electric charge, which could be carried out without any special preparations, a current of about two volts. After about six hours' discharge, however, the electromotive force sank to 1.7 volts, but on the battery being left to itself for twenty-four hours, it became a little increased. According to the measurements hitherto taken the functions of this accumulator were satisfactory. An attempt to substitute sulphuric manganese for nitric lead in this battery did not answer the purpose, as the peroxide of manganese separated itself, not in a continuous layer, but in loose scales. At another meeting of the same society on the 20th March, Dr. Gross, starting from theoretical considerations, instituted the following experiment: Two iron electrodes, overlaid with sealing wax in such a manner as to leave only the terminal planes free, were dipped into a solution of chloride of iron, closed by means of a galvanometer into a circle, and any inequalities there might happen to be adjusted according to the Poggendorf-Du-Bois-Raymond method. When, now one electrode was surrounded by a magnetizing spiral, there was seen, on its being magnetized, an electric current passing from the magnetic electrode through the fluid to the non-magnetic electrode. It might be thought that the current was a thermo-electric one, produced by the warming of the magnetizing spiral; but a delicate thermometer showed that the air within the magnetizing spiral was but 2° warmer than the surrounding air. Besides the electrode that was to be magnetized was surrounded by a double cylinder, through which water of a temperature 12° below that of the air was constantly flowing; and yet, notwithstanding this powerfully cooling influence, the current always passed from the magnetic to the non-magnetic electrode, whereas a thermal current must have passed from the warm to the cold electrode. The electric current was therefore produced, not by a difference in temperature but by the magnetization of the one electrode. The current continued so long as the electrode was magnetized. If the electrodes were now brought into a tube, and so arranged as to lie behind each other in the axis of the tube, with their free terminal planes turned to each other, then, on the magnetization of one electrode, an electric current again set in, passing now, however, from the non-magnetic electrode, through the fluid, to the magnetic electrode. The direction of the current was consequently dependent on the direction of the magnetic axis to the electrolyte and the second electrode. As conducting fluid only sulphates of iron could be used in these experiments, and of these only such as received the free terminal plane of the electrodes nakedly. Dr. Gross believed that the currents demonstrated by him in the experiments thus described were related to the thermo-electric currents between magnetic and non-magnetic iron wires, which were a subject of study to Sir William Thomson.

The Electric Season.

About this time, as the old almanacs used to say, look out for electric storms. The season of thunder and lightning may be said to have fairly opened, and henceforward tornadoes in the West and cyclones along the coast may be anticipated. The energy which during the winter months keeps up the supply of "cold waves" far beyond the demand for those unpleasant visitations, will now be expended in the frequent production of more lurid and sensational, and certainly not less mischievous, phenomena. The nature of the connection between electric energy and tornadoes has not yet been clearly ascertained by science, and no doubt one reason of this is the extreme difficulty attending the investigation of those erratic and ebullient manifestations. Blasius, perhaps, came as nearly as any one has to an analysis of a tornado; but even he was several miles away from it when it broke, and of course he was obliged to trust a great deal to conjecture. Nor does it seem possible to enlist the aid of lay intelligence in this research for the Western farmers and villagers, through whose fields, woods or houses the storm cuts a clean swath, have never yet been found in a philosophical frame of mind at the proper time, and have always evinced a strong tendency to explore the recesses of their tornado-cellars at the critical juncture.

As regards ordinary thunder storms, it is rather remarkable that, notwithstanding the steady progress of lightning-rod agents all over the country, the statistics of accidents caused by lightning remain about the same. Whether this is to be attributed to adulteration in the lightning rods, to the production of a more effective article of lightning, or to some fundamental flaw in the theory upon which the whole lightning-rod system is based, is a question to be determined only by patient and thorough investigation. The lightning season, however, sometimes, affords opportunity for interesting comparisons of the relative toughness and vitality of people from different parts of the country. The first storm, for instance, resulted in the "knocking out" of a New Jersey farmer. Another man would probably have been killed by a bolt that knocked a gold ring off his finger, but this old yeoman was only temporarily prostrated, and his wife was not hurt at all. It is now generally conceded that electric storms are irresponsible, and that it is not safe to attempt to deduce morals from them. They fall, like the rain, upon the just and the unjust. They are as likely to take the roof off a church as a tavern or a railroad depot. Possibly they counteract to some extent the languorous influence of summer, and no doubt they are instrumental in adjusting the meteorological balance, but whether they are better or worse than the phenomena of winter is a question not easily to be determined.

*** The Southern Bell Telephone Company operates 45 exchanges.

The Electric Laryngoscope and Universal Illuminator.

It will be superfluous to point here to the great value and the many advantages aimed at, when electric light is applied directly for the examination of interior cavities and for diagnosing. We are approaching the days when no physician will be without his electric lamp for certain examinations. As long as the electric light can be brought in reach of the part that is to be examined, thereby illuminating it brilliantly, it will be found to be an invaluable assistant to the medical profession. As there is very little heat produced, the lamp might almost touch the part in question without fear of scorching it. It should be understood that in bringing these instruments before the medical profession, it is not the intention to supply the physician with an electric light by which to enable him to perform his operation, but merely for examining and diagnosing. Operations of a short duration might as well be performed by the aid of these electric lamps, but it should be remembered that a brief application of the electric light will greatly economize the use of the battery, whether a primary or secondary battery is used. Curt W. Myer, 357 Fourth avenue, New York, is the inventor and manufacturer of the Electric Laryngoscope and Universal Illuminator.

The Electric Laryngoscope consists of a combination as shown in the illustration, viz: A novel form of a tongue depresser *T*, with an insulating handle attached, through which the conducting wires are passed to connect with the battery cords at PP^1; an electric incandescent lamp *L*, mounted and set into a shield tube *H* (a non-conductor of heat), with a double conducting ball joint movement *J*, and an adjustable slide *S*, which holds the lamp, and which is held firm to the tongue depresser by a set screw B^1.

It will be seen that every desired movement of the lamp has been provided for on either Laryngoscope or Universal Illuminator. The lamp may be set firm by pressure of the binding screw *B*; further, the position of the lamp on the tongue depresser can be changed, as it will slide back and forward. The lamp can be instantly brought in broken circuit at i^1, by slightly turning the lamp tube *H*, and the latter with its ball joint can be at once detached from the tongue depresser.

The lamp now can be set into another insulating handle or the Universal Illuminator at *J*, if the light is to be used for other examinations. The mounted lamp can be removed from the shield tube *H*, if necessary, by pushing it out of the tube through slot *S*. A duplicate mounted lamp, also a mouth mirror with handle, are added to complete this set of instruments, which are fitted in a finely finished pocket case lined with velvet. These instruments, in their present form, will be found to be an invaluable assistant to physicians and dentists, and their substantial workmanship will make them a lasting apparatus.

Double or single conducting cords may be chosen to connect the battery with the instrument. Each cord contains twenty-one No. 40 wires and is two yards in length, well insulated and quite flexible.

Telegraph Signals Among Convicts.

The credit of the invention of the most perfect system of communication between prisoners confined in one institution belongs to Jack Canter, at one time the most expert counterfeiter in the United States, if not in the world. He came from South Carolina and was educated in Paris as a physician. He afterward learned the art of engraving and then turned out as a professional counterfeiter. He has since reformed, after exposing the crookedness of the officials of a New York penitentiary and thereby securing a pardon, and is now earning an honest living under a different name in New York city. While undergoing a sentence in the Easton Penitentiary (Pa.) he invented a system of telegraphy with an alphabet similar to that invented by Morse. He found means of teaching his alphabet, to some of his fellow convicts, and in the course of a few months it was known to almost every convict undergoing a long sentence. Those who were released taught the system to criminals then on the outside of the walls, and in the course of time the upper strata of the criminal fraternity became expert telegraphers. The wires of this novel telegraph line consisted of the gas and water pipes which pass through every cell in the vast institution. They are excellent conductors of sound, and by means of sharp raps on the pipes with a piece of metal, or even the knuckles, an expert "operator" could easily and quickly send a message to a fellow prisoner whose cell was not far distant. If he wished to communicate with a man in another corridor, his message passed along from one cell or "relay station" to another, until it reached its destination. Every convict of any note had (and has) his "call," the same as operators along any telegraph line.

The system was divulged by its inventor to a prison inspector, and the convicts now find it difficult to send any important message, as the prison officials now understand the alphabet as well as the operators themselves. They are still able, however, to keep each other posted on the movements of noted criminals and the general criminal topics of the day. When a prisoner is discharged or a new convict brought in, the fact is immediately telegraphed around. A new arrival,

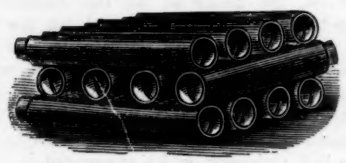
THE ELECTRIC LARYNGOSCOPE.

if he is in the secret, "wires" the news of the ouside world to the prisoners on the inside, and when a man is discharged he generally takes with him a number of "telegraphic" messages to outside friends of the convicts.

—— Now ninety public lights are running in Hartford, Conn.; five more are ordered by the Common Council, the State pays for six on the Capitol grounds, which are a part of the Bushnell Park enclosure, and six are to be placed in Union Grove. There are to-day 278 public and private lights in service in Hartford. Orders for sixteen more than the present plant can supply are on file, and the plant is to be increased by the company right away by the addition of a 75 horse-power engine and two 45 light dynamos.

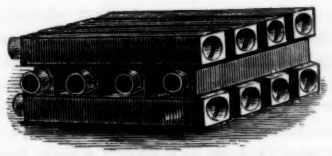
Underground Wooden Pipe.

The American Underground Wooden Pipe Company, of Williamsport, Pa., and Norfolk, Va., are manufacturing at Norfolk a wooden pipe for encasing telegraph, telephone and electric wires placed underground. These pipes are being used by the Western Union for the wires they are putting under



UNDERGROUND WOODEN PIPE.

ground in Washington, D. C. The pipe is made from a specie of the American cedar, the cypress variety, which is considered by those of authority on the subject to be the variety that will last the longest under ground, and it is further believed that, buried in the



THE AMERICAN UNDERGROUND WOODEN PIPE.

ground, it will never decay. The manufacturers state that they have proof of where this wood has been in the ground 100 years and yet showed no signs of decay. The pipe, as manufactured, is coated on the outside with a preparation of asphalt cement that prevents all moisture from entering. Being perfectly smooth inside, no splinters or sharp edges whatever, the wires can be drawn through the pipe without stripping or tearing the insulation. The elasticity of the pipe will prevent any breaking from heavy pressure on the street surface, and it can be cut into at any point to get at the wires, and repaired at trifling cost. We illustrate round and square sections of the pipe in this issue of the REVIEW, and it will be seen that it only requires driving together to lay it securely. This company also manufactures water pipe that is warranted to stand a pressure of 160 pounds to the square inch.

Patents and Fortunes—Waves or Impulses.

"Do patents cover principles and processes? I thought you could only patent a device for producing certain results," said the lawyer.

"Yes, that's so; but you know when there is big money at stake every little thing is raked up. It often turns out that an immense fortune hangs upon a single fact in science. These processes for converting iron into steel differ only in a strictly scientific aspect. The ordinary mechanic, or even a clever ironmaker, can see no difference in the operation, yet there are millions depending upon the question of science at issue."

"If reports are true, there is a chance of several of them getting knocked out by the new process," observed the lawyer.

"Yes, I guess the reports are true. If I had a steel patent I would try and get it ashore as soon as possible. It doesn't pay to be afloat on a water-logged patent and take the risk of getting knocked clean out of water by some new device."

"What particular case were you referring to?" queried the lawyer, taking a toby out of the patent man's vest pocket, and coolly asking him for a match.

"The case in point is that of the Bell telephone against the Randall and other 'make and break' current machines. The case has been tried over and over, until now it is reduced to the mere question of what sound is," replied the patent man, vainly endeavoring to palm off a tooth-pick on the lawyer for a match.

"I'd like to know how they can raise such a question in this case?" said the lawyer.

"Well, it is just this way," explained the patent man. "It is claimed by the Bell people that sound is caused by the action upon the ear of vibrations of the air called sound waves. Bell claims these waves to be continuous and unbroken, while the others claim that their instruments produce sound by a series of short breaks in the current; therefore the whole thing turns on the single fact as to whether sound is the result of a continuous wave or a series of separate impulses."

"Is there no disagreement as to the devices or machines for producing or conveying sound?" asked the lawyer.

"No serious di-agreement, but the other question is a poser. The best natural scientists in the country are making each other's hair fly about it. One says sound is produced by an unbroken wave, and the other is just as positive that it is caused by a series of taps or impulses. So they go. There will be a picnic here when the case comes up for argument."

"Who will have the picnic?" asked the lawyer.

"The Judge," replied the patent man; "and I don't envy him his job of deciding when doctor's disagree."

"Does the same trouble apply to patents in general?" queried the lawyer.

"No; only in those where there is a fortune in sight or a good chance to establish a monopoly," replied the patent man.

"Which side do you think will win?"

"Don't know. Don't know what sound is myself; don't know whether any other fellow knows, and don't care much: but I would like to get a few points on electricity."

With this the patent man walked off in a thoughtful mood, and left the lawyer musing over the picnic in store for the Judge.

The Consolidated Company's Purpose.

The following plain statement of their views and intentions has been mailed to users of incandescent lights by the Consolidated Electric Light Company;

"For the purpose of enabling those interested to place a proper value upon statements recently advertised by the Edison Company concerning the Sawyer-Mann patents, owned and operated by the Consolidated Electric Light Company, the following extracts from the specifications and claims of the patent 317,676, dated May 12, 1885, application filed January 9, 1880, are published;

"'Our invention relates more especially to the incandescing conductor, its substance, its form and its combination with the other elements composing the lamp. Its object is to secure a cheap and effective apparatus, and our improvement consists, first, of the combination of a lamp chamber composed wholly of glass, as described in patent No. 205,144, of an incandescing conductor of carbon made from a vegetable fibrous material, in contradistinction to a similar conductor made from mineral or gas carbon, and also in the form of such conductor so made from such vegetable carbon and combined in the lighting circuit within the exhausted chamber of the lamp.'—*Extract from Specifications.*

"'An incandescent lamp consisting of the following elements in combination: First, an illuminating chamber made wholly of glass, hermetically sealed, and out of which all carbon-consuming gas has been exhausted or driven; second, an electric circuit conductor passing through the glass wall of said chamber and hermetically sealed therein as described; third, an illuminating conductor in said circuit, and forming part thereof within said chamber, consisting of carbon made from a fibrous or textile material, having the form of an arch or loop, substantially as described for the purpose specified.'—*Fourth Claim.*

"This patent was issued after a litigation in the patent office with Edison covering five years, and its importance and value has been acknowledged by some of the leading companies who have agreed to pay royalties for license to manufacture.

"It is not the purpose of this company to send threatening letters to users of incandescent lights, or to attempt eo increase its business by newspaper controversy, at the same time it is but proper to inform the public that *proceedings* have been commenced against infringers, and the company will resolutely maintain its claims by the proper legal methods.

"CHAS. H. BANES, President."

ELECTRICAL REVIEW

A WEEKLY JOURNAL OF ELECTRIC LIGHT TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Published at 23 Park Row.

P. O. BOX 3329.

GEO. WORTHINGTON, - - - Editor.
CHARLES W. PRICE, - Associate Editor.
LOREN N. DOWNS, - - - President.
C. C. HASKINS, GEO. A. HAMILTON, } Consulting Electricians.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.

Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

EDITORIAL ANNOUNCEMENT.

Address all communications and make all checks and P. O. orders payable to order of ELECTRICAL REVIEW P. O. Box 3329, New York

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill. will represent the REVIEW in the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street London, England, are our representatives for Great Britain.

NEW YORK, JUNE 20, 1885.

CONTENTS.

	PAGE
Electrical Firearms and Cartridges	1
Notation and Nomenclature	2
A New Secondary Battery	2
The Electric Season	2
The Electric Laryngoscope and Universal Illuminator	3
Telegraph Signals Among Convicts	3
Underground Wooden Pipe	3
Patents and Fortunes—Waves or Impulses	3
The Consolidated Company's Purpose	3
Editorial Notes	4
Burying Both the Wires and the Rights of the Companies	4
The New Gimé Accumulator	4
The Decline of the Cow	4
The Electrical Tests at Philadelphia	5
General Western News	5
Telephonic News	6
Ancient Telephony Among the Chinese	6
A Train Dispatcher's Qualifications	6
New Post Office Regulations	6
Primary Batteries	6
The First Telegraph Wire	7
Telegraphic News	7
Electrical and Scientific	8
Lightning's Freaks	8
A Boom in Lightning Rods	8
Thermo Piles at the Philadelphia Exhibition	9
The Way Incandescent Lamps are Made and the Air Exhausted	9
Electric Light News	9
Electrical Patents	10

Col. R. C. Clowry, General Superintendent of the Western Union at Chicago, has been made Acting Vice-President of the Company. This is a deserved compliment to one of the ablest telegraph men in the United States.

There is much interest taken in the new telephone transmitter invented by James P. Freeman, of Chicago. The claim is made for it that articulate speech is transmitted telephonically, by causing "intermittent electrical impulses to traverse an electrical circuit, and thereby generate secondary electrical impulses which in turn actuate a telephone receiver and cause it to accurately reproduce the articulate speech." Nearly 20,000 copies of the patent have been sent out since it was granted, May 19th.

The much talked of Conference between the American Bell Telephone Company and a few of its licensees, held in Boston last week, as noticed in our last edition, was hardly what the invited guests expected. First, as regards the relation of the parent company to the sub-companies in the matter of rentals to be paid, and this was really the only important matter before the parties in interest, the action of the Bell Company was to an outsider quite liberal, but not to an insider who knows the situation. The proposition made by the Bell Company was really a step taken in their own interest. The Conference almost immediately after assembling, had read to them a letter from the Bell Company, which announced that a reduction would be made. Such a reduction was necessary in order to keep the instruments in use, as the places affected would have to discontinue business if the present rates continued. It is possible the sub-companies will find that the general impression among their subscribers is, that they have had a material reduction made in the price paid for instruments, and that a corresponding reduction should be made to users, while the fact is but a small reduction has been made, and it affects only a comparatively few subscribers who are now paying minimum rates. The whole affair was made an occasion for the parent company to show its licensees a little hospitality, and to try and create a little good feeling, which is much needed at the present time.

BURYING BOTH THE WIRES AND THE RIGHTS OF THE COMPANIES.

Gov. Hill having signed the Underground Wire Commission Bill, it has been placed on the Statute books, and is a law. It provides, as we know, for the appointment of a temporary Commission of three persons here and in Brooklyn. They are to see that the law is enforced and the wires buried by November 1st next.

According to the bill, sixty days from the signing of the bill will be allowed the companies in which to submit their plans, failing which a plan is found for them.

This is a supplement to the bill passed last winter, and had it not been introduced, it is safe to say the environs of the cities of New York and Brooklyn would have been without telegraph or telephone service, for surely no company would have gone to the expense of burying wires along country roads.

Senator Daly, who is the father of this bill, seems to have settled, to his own satisfaction, all the technical points as to the working of the wires under ground and the sanitary question regarding the tearing up of the streets when cholera is expected. He said last week in an interview:

"I look upon the reasons advanced by the Board of Health against the opening of the streets as simply puerile and ridiculous. As plain matter of fact, there will be no need of having more than 50 feet of any avenue or street open at the same time in the prosecution of the work required to carry out the law, and there is no time or season of the year when some part of our streets is not torn up to a greater extent than that. One of the main objects of the commissions to be appointed is to prevent, as far as practicable, the giving to the companies the right or privilege to tear up our streets and put down separate tubes for their wires. It they were allowed to do this the streets would be practically impassable during the progress of the work, and possibly there might be some ground for the theory that so much excavation would breed disease. But it was demonstrated by able electricians before our committee that 1.500 wires can be successfully operated in a single eight-inch tube. Telegraphic and telephonic wires can be operated in the same tube, but the electric light wires will have to be in a separate tube, the current over them being so strong that it would interfere with the telegraph and telephone wires. The duty of the commission is to see that some arrangement is adopted by which, instead of each company laying a separate tube for its wires, all the wires shall be operated, as far as practicable, in one or two tubes, and each company shall bear its proper proportion of the expense. If the companies choose to submit an available plan for accomplishing this themselves, the commission will adopt it. If they do not, then the Commissioners will frame their own plan, and the companies will have no choice but to follow it."

Senator Daly, as will be seen by this, proposes to prevent the companies from laying their wires separately and from tearing up the streets, save when, in his opinion, or in that of a committee, it shall seem advisable. Truly, this is curious legislation in a free country. The State breaks its contract with them as to stringing its wires through the streets, and make the companies as uncomfortable, and put them to as much expense as possible, propose to tell them when they can and when they cannot have access to their own lines.

But thanks be to heaven, no Daly or any other blatherskite can run this city for any length of time. The courts and the law are left yet, and it remains to be seen what they will do to protect corporations performing a valuable public service from the assaults of the Dalys of the legislature.

Unless the signs are all wrong, an injunction will be applied for to prevent the execution of this unjust law.

Senator Daly's idea of running all the telegraph and telephone wires underground in the same narrow conduit, sounds extremely well, especially to those who are profoundly ignorant as to the problems connected with burying the wires, and his idea that the companies, when once the wires are down in the ground, should be prevented from having access to them, is a very ingenious plan, the only extraordinary thing about it being that no one has ever thought of it before. In his whole scheme, there is only one thing he seems to have forgotten to tell us, and that is, how the wires are going to work under the circumstances. Possibly he proposes to force them to work by act of the legislature.

THE NEW GIME ACCUMULATOR.

It is pleasing to note the many changes, small as well as great, which are continually taking place in the construction of primary and secondary batteries, because, like a great many others, we are convinced that much is to be expected in the future from one or the other or both of these wonderful conceptions. The electrical field is particularly active just now in this direction, and every one intelligently at work therein should be encouraged to continue. Indeed, it seems a mistake to pass over slightingly the work even of those who do not obtain better results than those already obtained in the old way, if they secure this result in a novel form, because it is upon just such bases that some of the grandest conceptions have been founded. The solution of a great problem assuredly merits applause, but the man who proves that his fellow-workmen are on the wrong track, and that what they are after cannot be found in the manner they have proposed to themselves, has also strong claims upon their gratitude, for he has rendered an important service. And so we watch for work in the direction of the storage battery with more than ordinary interest and solicitude, hoping that imperfect conception of one or more electricians in this particular field may, when joined the one with the other, give important results. The very latest novelty in the line of storage batteries is the result of the efforts of M. Gimé, who, as we are informed, is rather more of a mechanician than an electrician. We take the following description of this device from our French contemporary, *Bulletin International des Telephones:* The new accumulator of M. Gimé is composed of cylindrical tubes of lead, placed vertically in the following position : o o / o / o o in an oaken chest, lightly coated with gutta-percha, and forming a series of lines analogous to and in much the same manner as the plates of other accumulators. All the tubes of the same line communicate with each other, the alternate lines being joined to the negative and positive poles of the battery. The tubes are filled with sulphate of lead, which the inventor has found to be preferable to red lead, and perforated with vertical apertures, which permit the liquid to enter and rise to the top.

The combination of elements does not differ essentially from that found in the ordinary type of accumulator. But the construction of the battery is unique and possesses this advantage: The leaden cylinders, when in use, can be far more readily removed than the plates of other accumulators.

From the information given by M. Gimé of the work of an element of one hundred kilogrammes—the only type yet constructed—the formation of the element lasts 120 hours. It returns in the discharge 85 per cent. of the energy absorbed during the charge. Its practical capacity is 3.700 kilogrammeters per kilogramme of lead, and its electro-motive force at the discharge is more than three volts—sometimes as high as 3.5 volts. We give these figures as they have been given to us, and without vouching for their accuracy. The last assertion, above all—viz., as to the E.M.F.—is especially doubtful, and should assuredly be taken *cum grano salis*. For the chemical action produced by the element, Gimé would seem to be almost identical with that observed in the Planté secondary battery, as well as in the Faure-Sellon-Volckmar type, and, so far as we can see, there is nothing in the construction or working of the Gimé battery that explains how such an E.M.F. as that claimed by the inventor could be generated.

Nevertheless, the new apparatus shows great ingenuity in its construction, for it is simple, and permits of the easy and expeditious removal of the positive leads, which, if the battery possesses the economical qualities attributed to it by its inventor, will serve to make it particularly valuable in industrial employment.

THE DECLINE OF THE COW.

An ingenious Yankee has devised a machine for milking cows which, a despatch says gives great satisfaction to the farmers of Orange county. We haven't heard from the cows yet, but incline to the belief that it is not regarded by them with the same amount of the favor. Butter, we know, can be made without the interposition of cream, and now we learn from our French contemporary, *Le Courrier des Brevets d'Invention* that a process has been discovered whereby butter may be made by electricity without the aid of churn or dairy-maid.

There is now no need of the milkmaid nor of milk, no need of the dairy-maid nor of cream, and only one thing remains wanting to make our happiness complete, and that is a process by which butter can be made directly from grass. When that time comes we shall have no more use for the cow, and who knows but the day will come when in like manner we shall be able to dispense with the services of the goat as well. We take the liberty of suggesting this train of thought to our brother Yankees at large as well as to ingenious French chemists of the new school. We have seen honey and the honeycomb, both of which were the product of the manufactory rather than of the bee-hive, and many are eating this honey today without suspecting its origin, though there be some—very exacting people these—who refuse to eat it, and record their preference for what they are pleased to call "old-fashioned" honey, by which they mean that made by bees.

Our contemporary *Le Courrier des Brevet d'Invention* says that the manufacture of butter by electricity is a great surprise to it. We can truly say that it is no less a surprise to us. It says:

"A chemist has invented a new process for the manufacture of butter. The milk or cream is placed in a recipient and by means of two electrodes which plunge into the liquid, the electric current is established so thoroughly that the particles of butter are separated from this liquid and rise to the top. By the assistance of a dynamo-electric machine having the power of forty elements,

forty-five liters of liquid (about 8¼ gallons), are converted into butter in five minutes.

In a recent number of the *Journal des Debats* is an account of some experiments that had been made at Rezonville, unless we are much mistaken, looking to the making butter by electrically treating the milk. We do not know if this is the same process as that above described. If so, there is a singular and unaccountable discrepancy in the quantity of butter made, and the time required to make it, between the statements of these two French journals, and that being the case, we naturally give to the technical paper, our contemporary, the benefit of the doubt, but we should feel obliged if it would give us some further details as to any results that may have been had from a real test.

THE ELECTRICAL TESTS AT PHILADELPHIA.

Editors of the Electrical Review:

My Dear Sirs :—Do me the favor to correct in your next, what I take to be an unintentional misstatement of my remarks regarding the "Electrical Tests," which appeared in last week's issue, and for which I must disclaim responsibility.

I stated to your representative, as I have invariably stated to numerous other inquirers, that I could give little or no information regarding them, and that the proper person to apply to for information was Mr. Tatham. Beyond this I do not recognize the statements credited to me as my own.

Yours truly,

William H. Wahl,

Secretary Franklin Institute.

Philadelphia, June 16, 1885.

GENERAL WESTERN NEWS.

Arrangements are being consummated here for a very practical test of the value of electric motors for railway purposes, the result of which will be given in due time. A motor of the proposed form is at present running a machine shop just out of the center of the city, and is doing its work in an eminently satisfactory manner, both as regards efficiency and economy.

The *Electrical Review*, of London, says that the loss of energy with electrical railways with separate conductors, is far greater than is generally understood. The Portrush road is cited as an example in question. The initial force is 250 volts, with an intensity of 100 amperes, while the line resistance is but 2 ohms, yet at the farther end of the route, it is seen that nearly 80 per cent. of energy has been lost. Inasmuch as the machines are run by water-power, the cost of this waste is a minimum compared to a similar waste from artificially produced energy.

Messrs. Berthoud-Borel, manufacture a new form of insulating compound from linseed oil. The oil is heated to 300° (570° F.), and held at that point until it is reduced to a syrupy consistency, having a brown color. A quantity of colophony is then added, and the mass kept at a lively ebulition for some time. Substances to be covered, wires, etc., are plunged into the melted matter at a temperature of about 390° F.

Somehow or other the dear people in Chicago have failed to "catch on" to the cholera racket, apropos of opening up the streets to perform the graveyard act for the wires and other underground work now being done. The fact is that the dilemma had two horns. The wires had to go underground, and as the only way to get them there was to put them there, why, the streets had to be torn up to accomplish this, and the chief croakers have not as yet peeped on the question of cholera from this standpoint.

Holders of policies in the Telegraphers' Mutual Benefit Association were both surprised and gratified on receiving their monthly notice on the first proximo.

Gen. Anson Stager, who was a member of the Association, left a memorandum on the envelope containing his policy, donating the insurance, $1,000, to the Association, which action, connected with the fact of "enough funds on hand to meet all claims so far reported," precluded the necessity of the usual monthly assessment of $1. The Secretary reports the reserve fund on hand $40,000—an increase of $5,000 since the last annual meeting.

The memorandum above alluded to, bore date 20th April, 1880.

The underground people are as busy as flies in a sugar hogshead. The system which was recommended by Prof. Barrett, and adopted by the city for its wires to the new city hall, the D. H. Dorsett patent, is the system now being put in by the Chicago Sectional Electric Underground Company. Nearly all our business streets have been opened to pieces this spring, to accommodate the gas, water, sewer, or electrical conduit people, and we have been treated to all the unearthed smells which are possible under the circumstances. But it is getting better. The conduits are going in rapidly, followed up, as the builders are by the whip of the city authorities, and the time is not far distant when there will be nothing to complain of in the matter of overhead wires. Twenty miles of this conduit, of the forms adapted to electric light, telegraph and telephone lines, are to be put in this season. The capacity of these sections varies according to the needs of the service, from 7 to 19 compartments in each. A cable of 200 telephone wires could easily be accommodated in either of these compartments.

Of the above work, fully 5½ miles have already been laid, and the work will be pushed rapidly as possible until all is finished.

The material of this conduit is an asphaltum concrete, and it has been claimed by its opponents that a change of level in the bed of the conduit, due to settling of the soil, might subject it to a ruinous crushing strain. This theory was put to a severe test a few days since on Dearborn street. The lateral conduit leads from the manholes, at the intersection of the street and alley, to the four divisions of the block, by some misunderstanding or change of grade were left exposed about four inches above the grade. When the foundation came to be rolled, a forty-ton roller was driven over these pipes, and out of about fifty of the connections only two were loosened.

A visit to the rooms of Prof. Elisha Gray brings up to the mind of old telegraph and telephone pioneers many reminiscences.

The Professor has a show case fitted up in one corner of his private office, which contains among other curious historical affairs connected with the telephone enterprise, an apparatus which looks like a diminutive catapult or bow-gun. The string is of steel, but the bow is of iron. Before the string stands an electro-magnet, which tells that this was one of the early receivers of the present harmonic system, a system which at the start was to become a telegraph or a telephone, according to circumstances.

There is also the outcome of the bath-tub experiment, the violin receiver the tin-pan receiver, the revolving drum receiver, and others of various kinds and forms, some of which, like the tambourine receivers, are but remnants of their former selves.

The variety of transmitters is equally as full and varied, from the simplest single tone affair up to a two-octave instrument for the transmission of music between distant points.

It was in using this that the operator in Chicago, playing for a Milwaukee audience one night, scared a railroad operator and his family who heard ghostly music on the relay, late at night, and compelled them to lodge in a hotel through superstitious fear.

And in one corner of the case, a curious looking affair, with crank and wheels and pen points, and chemical paper rollers, is Cushing's ingenious apparatus for ascertaining the speed of a cannon shot, a racing horse, or any other moving body. The three pen points through an interrupter with a given speed of vibration, and a battery, mark three parallel lines of dots upon the paper. The ball breaks the battery connection of one of these at the start, and a second one at the target. Connecting the dots and portions of these in the middle row included between two perpendicular lines, where the two outside rows are broken, gives the speed.

Gray's curious repeater has also a prominent place in the collection.

Speaking of telephones in the early days of the art, brings to mind a curious fact—the different degrees of sensitiveness of almost every one's two ears. Nearly everybody is affected more or less with this peculiarity. Yet it is nothing strange when we remember that one hand is usually more dexterous than the other—our two eyes are often quite different as to focus, and even the nerves of the nose are more sensitive to the appreciation of delicate odors in one nostril than in the other.

The anecdote illustrating this peculiarity is this: A subscriber, in the early days of the telephone exchange here, came one morning to the Superintendent of the company, and complained bitterly that he could do nothing with his instrument, and ordered it out because the company would not fix it so he could hear.

Said the Superintendent after surmising the trouble, "Which ear do you use?" "Why, the left, of course, same as any one else, I s'pose." Calling to the messenger boy present, he sent to the shop for a "right hand receiver," which he placed on the line, and requested the gentleman to "use this receiver, which is made expressly for the right ear." The result of the experiment was eminently satisfactory. The gentleman was much astonished to find he had been partially deaf, from a child, and revoked his order to remove the telephone.

A new company was organized here, a few days since, who purpose the establishment of central stations, and renting lights, either arc or incandescent, on a large scale. The systems used will be the Western Electric, both dynamo and lamps for arc lights, and the Mather dynamo and Perkins lamp for incandescent illumination. These parties have arranged for the placing of their wires underground in the Dorsett conduit, along and across the streets.

Our exposition building, which has undergone as many changes as the fashion in ladies' head gear every season, for years, has again been re-vamped, and on the 8th instant became a temporary opera house for a season of nine weeks, and is occupied by the Thalia Opera Company from your city. As it has come to be the rule here that no amusement hall of any description is in proper form without electric lights, the building has been lit up by 30 Western Electric arc lamps. The result is highly satisfactory, and the effect pleasing in the extreme.

Grenier's billiard saloon and bar room on the west side has been recently supplied with four 150 candle-power incandescent lights on the existing arc circuit, where they are substituted for two arc lights. The new lamps are Stanley's, and the billiard punchers are highly delighted with the steadiness of the illumination as well as its evenness and intensity.

The Thomson-Houston people are doing but little in the city, but claim to have plenty of business in outside localities. They recently sold a plant for commercial purposes at Jacksonville, Ill., comprising 25 lights. Mr. Crosman, the manager here, says the parties are so well pleased they have written, asking permission to pay the bill nearly a month before it is due—a novelty in the electric light business.

The same company had an exhibit at Adrian, Michigan, on the 6th instant, which was thoroughly satisfactory, and a sale of a 30-light plant was made. Since that time other parties have advanced their claim for a hearing, and a competitive test of two or more systems is likely to result before any dynamo is placed.

At Minneapolis, Minn., the insurance underwriters have followed in the track which is now becoming well beaten, and inaugurated Rules relative to electric light wires.

Among the licenses of incorporation issued by the Secretary of State, on the 10th inst., is one to the Badger Illuminating Company at Chicago, with a capital stock of $64,000. Object of the company—to furnish electric light and manufacture electrical apparatus.

A patent was recently granted for protecting parties handling electric light circuits, adjusting lamps, etc., while the current is passing on the wire, by means of a conducting wire, which connects the extremities of the operator, short circuits the lamp from the hands, and also makes a ground connection down the legs to the feet. It has been suggested that a jumper, to which a ground connection is attached, sprung on to the two terminals of the lamp, would accomplish the same purpose in a more simple manner, and, while equally effective, would permit of the free use of both hands, without the necessary care required to insure metallic contact with the wire terminals at the hands.

Chicago.

EDISON ELECTRIC LIGHT COMPANY, HARRISBURG, PA.

This company has been in operation about three months and is reported to be on a dividend-paying basis from the start, a rather unusual thing. It generally takes a gas company a year to get their business on a paying basis, and this has heretofore been the result with starting central electric light stations on the incandescent system. It has generally taken a long time to get customers to pay for wiring their stores, but this company adopted another rule. They have paid for all the wiring themselves, simply requiring a contract for a year at so much a lamp, payable monthly. The average charge is 75 cents for a lamp (of 16 candle-power) a month, and the system is so popular that every lamp of their present capacity (3,500) is sold and they have decided to enlarge their works. They have among their customers the lighting of the State Capitol, at $1,000 a month the year around, and have a three years' contract. In their present district there are twelve hotels, large and small. These have all discarded gas all over the house and use nothing but incandescent lights. These lamps can be lighted at any time of the day or night as the engines are always at work. With a few exceptions the Edison lamps are fitted to the old gas fixtures and the average expense to the company has been about $2.50 per lamp. The popularity of the new light is so strong that without exception, all the users have taken out their gas meters.

Most of the central stations using the Edison system have laid their wires under ground, without doubt the best way but the most expensive. In Harrisburg the wires are all over head, and a better working station cannot be found in this country. The electric light station is one of the best ever erected, and situated among residences close to the State House, it is an ornament to to the street and city.

The electricity is developed from six No. 20 and two No. 10 Edison dynamos. They are driven by four high-speed engines belted direct to the dynamos. The steam is generated in four six-foot steel tubular boilers, which are set with the "Jarvis Patent Furnace," and the fuel used is anthracite and bituminous screenings that cost less than $1 a ton. With this quality of fuel, steam power can be furnished at a very low cost; selling electricity in the shape of incandescent lights is in reality selling power, and the cheaper this power can be produced the better the results. The success of this installation is owing to the company adopting the overhead system of running their wires, in connection with paying for wiring the stores and residences of their customers. They do not waste any power in running long lines of shafting, and use only waste fuel to make steam. It will pay anyone interested in the success of incandescent lighting to visit Harrisburg and see the plant in operation.

Telephonic News

*** The western telephone managers are kept awake about this time of the year thinking of cyclones.

*** The underground telephone and telegraph wire bill was killed by the Pennsylvania legislature. It was the fourth on the calendar when the final adjournment occurred.

*** Corry and Erie, Pa., have been connected by telephone. This will give Erie connections with Wattsburg, Millvillage, Waterford, Union City, Lowville, Elgin, Corry, and thence to Warren and all intermediate points on the P. and E. road.

*** The loss at the fire in the telephone office at Detroit was found to be very serious on a close inspection of the wires. A new set of cables will have to be provided, but there is no interruption in the service. The operation of State lines was suspended for a few days. It is estimated that it will cost $2,500 to repair the damage. A circuit of the Bankers and Merchants' Telegraph Company was burned out in the fire, and it is considered remarkable that no more damage was done.

*** Miss Nancy J. Stubbins, of Hairytown, N. J., patented a new kind of telephone which will work a revolution in the dissemination of news. In seven minutes by the watch, the choicest bit of scandal can be scattered to the four winds of heaven in a more approved style than could be effected by seven hours of the most industrious gadding. The inventor wears a large leather medal presented to her by the suffering society of New Jersey.

*** The annual meeting of the stockholders of the Rocky Mountain Bell Telephone Company occurred at Salt Lake City, June 8, and the following board of directors was elected: C. F. Annett, J. J. Dickey, Thomas Sherwin, C. Jay French, Geo. M. Scott, Geo. Y. Wallace, C. W. Lyman, H. C. Hill, and Chas. S. Smith. The officers re-elected were C. F. Annett, president and general manager; J. J. Dickey, vice-president; Chas. S. Smith, secretary; Geo. Y. Wallace, treasurer.

*** We have received a directory of the subscribers to the Lancashire and Cheshire Telephone Exchange Company, England. It comprises names of subscribers in Manchester, Manchester sub-district, Lancashire, and Liverpool district. On the back page of this very complete and well arranged list is a map of all the territory of this company, which shows all the connections and branch exchanges, and indicates the number of trunk lines extending between the different points.

*** The most bountiful display of flowers probably ever seen in business offices was that at the headquarters of the American Bell Telephone Company in Boston, Saturday of last week. The licensees, who had been attending the conference, and who desired to testify their appreciation of the most generous treatment accorded them by the parent company, arranged to decorate the officers' desks and chairs with flowers, and this was done in elegant style. Every desk was covered with beautiful floral designs so deep that no woodwork was visible. The designs on the desks of Mr. Forbes, Mr. Vail, Mr. Madden, and Mr. Gilliland were particularly beautiful. The surprise was complete, none of the gentlemen having received any hint of what was coming. The flowers were so deep that all promptly decided that to open the desks was impossible that day, and business was not commenced. None of the clerks of the company were overlooked, and not a desk or chair left without its supply of beautiful flowers. Mrs. Gilliland, Mrs. Haskins, Mrs. Hibbard, and Mrs. Durant were especially active in the work of arranging the flowers, and to their excellent taste much of the success of the occasion can be attributed.

*** The Missouri and Kansas Telephone Company is booming. Since April 1st this company has added 10 subscribers at Atchison, 8 at Leavenworth, 58 at Kansas City, 15 at Topeka and 34 at St. Joseph. The new multiple switchboard at Kansas City, making the sixth, is nearly up, and will be full by the time another one can be put up. There are now 1,040 subscribers in this city, and the indications are that the present rate of increase will continue until it reaches 2,000 subscribers. Kansas City is a good telephone town, evidently.

*** Counsel for the American Bell Telephone Company concluded the argument before Judge McKennan in the United States Circuit Court, Philadelphia, upon the application made in behalf of that company to have the Clay Commercial Telephone Company finally enjoined from using transmitters and receivers alleged to be infringements upon Bell's patents. The court reserved its decision, after stating that the findings of various other circuits already on record, establishing the validity of Mr. Bell's patents, would not be disturbed.

*** "One hundred doses for a dollar," is the way a patent medicine heads its "ads." Man takes a dollar's worth. Then the undertaker comes along, and it costs the man $100 for one dose. Thus we see all things come around even in this old world, after all. When wheat is cheap flour is high, and when you can buy a whole stall-fed ox for 4 cents a pound, beefsteak keeps right up to 19 cents, with a close flavor of the horns at that. When the telephone company chops two holes through the roof of your house for nothing, it makes up for it by charging you 50 cents for telling the coal man to bring you 12 tons of hard coal when you only tried to order three quarts of ice cream from the confectioner's.—*Burdette.*

*** The Austrian Minister of Commerce has just rendered his decision in the action brought as to the validity of the Bell patent in Austria. Claims 13 and 15 of the patent have been declared inadmissible and null. Their tenor is as follows: 13. The combination in an electric telephone of a plate with a magnet furnished with bobbins at its extremity, and placed near the plate. 15. The application to an electric telephone of an acoustic tube to augment the effect in transmission. On the contrary, claims 11, 12, 14 and 16 have been admitted. This case has been pleaded before the different tribunals of Austria for the past four years. Several manufacturers had commenced the construction of Bell telephones, and the managers of the Bell Telephone Co. of Anvers caused the seizure of all the apparatus manufactured. In return, the manufacturers brought suit to test the validity of the patent, basing their case principally upon a publication of the invention prior to the date of the patent.—*La Lumiere Electrique.*

*** The development of the telephone in the hands of the German Post Office is a further witness to the better side of paternal government. The telephone has been largely taken advantage of for private communication between offices, warehouses, and private residences, but the main use of it is in connection with the exchange. Berlin had an exchange of 2,570 members June 1. There are offices at the Central Telegraph Office, Oranienburger Strasse, Unter den Linden, Halle Gate, Köpnicker Strasse, and Central Market. At these offices a numbered list of the members may be seen, this list being also supplied by the Post Office to each member, and the additions periodically intimated. Anyone desiring to speak to a member may enter an office and request to be put in communication with Number So-and-so. The fee for this is 50 pfennig, and the time allowed is five minutes. This time, however, is not strictly observed, unless a second person is waiting to speak with the same member. When the conversation is finished a bell is rung at the central office. This, indeed, is a popularizing of the telephone, which not only citizens, but visitors to Berlin who take the trouble to familiarize themselves with the Post Office arrangements, may employ to the great saving of time and trouble.

Ancient Telephony Among the Chinese.

The following communication was recently made to a meeting of the Royal Asiatic Society in Shanghai: "It detracts nothing from the merit of the ingenious physicists who have conferred on mankind the boon of the telephone that its principles are familiar to uncivilized peoples, several of whom are in possession of rudimentary telephones. It was, I opine, when the Chinese were in their youth that they constructed the rudimentary instrument a specimen of which I herewith transmit for the society's museum. It consists of two bamboo cylinders, from one and a half to two inches in diameter and four in length; one end of each is closed by a tympanum of pig bladder, which is perforated for the transmitting string, the string kept in place by being knotted. This rude instrument is styled the 'listening tube,' and is employed for amusement as a toy, conveying whispers forty or fifty feet. It is unknown in many parts of the empire, Chihkiang and Kiangsu being the only provinces (so far as I can ascertain) where the listening tube is employed. Besides this toy, Chinese ingenuity produced about a century and a half ago the 'thousand-mile speaker.' The implement is described as 'a roll of copper, likened to a fife, containing an artful device; whispered into and immediately closed, the confined message, however long, may be conveyed to any distance; and thus in a battle secret instructions may be conveniently communicated. It is a contrivance of extraordinary merit.' The inventor of the 'thousand-mile speaker,' Chiang Shun-hsin, of Huichoo, flourished during the reign of Kang-hsi, seventeenth century. He wrote on occult science, astronomy, etc. The above account of this invention was taken from his works by the author of a Fuhkien miscellany. At that time—reign of Kien Lung—there was no longer an instrument of this description in that province."

A Train Dispatcher's Qualifications.

A train dispatcher, in order to meet the necessary requirements of his position, should be quick to perceive and as ready to execute. The moment any train is announced as being in need of special orders, the whole line, with the relative positions of all the trains thereon, should flash before his mind, and he should be able to instantly judge of the course of action to pursue. He must be possessed of good judgment or be liable to make many mistakes which, though of themselves not serious, yet will not tend to facilitate the business in the manner wished. He must be cool, always collected, and patient to a heroic degree, else, with the natural anxiety that an earnest and conscientious dispatcher always feels for the safety and satisfactory working of the trains, he will be apt to worry himself to an unnecessary degree in endeavoring to have stubborn conductors understand the orders communicated, or annoy himself beyond measure by the slowness or stupidity of "plug" operators in receiving or transmitting messages, consuming valuable time, in every moment of which he sees rare possibilities slipping from beyond his reach. He must have decision of character and executive ability of no mean order, for on these depend no small part of the success which should attend his labors. He should be tireless in his efforts, unceasing in his vigilance, and wide awake to almost everything that, in the natural order of things, would arise to affect the surroundings.—*Exchange.*

New Post Office Regulations.

The following are the new regulations of the Post Office Department, which go into effect on the 1st of July next:

1. Any article in a newspaper or other publication may be marked for observation, except by written or printed words, without increase of postage.

2. All newspapers sent from the office of publication, including sample copies, or when sent from a news agency to actual subscribers thereto, or to other news agents, shall be entitled to transmission at the rate of one cent per pound or fraction thereof, the postage to be prepaid.

3. The weight of all single-rate letters is increased from one-half of one ounce each or fraction thereof, to one ounce each or fraction thereof. The same increase of weight is allowed for drop letters, whether mailed at stations where there is a free delivery or where carrier service is not established.

4. A special stamp of the value of ten cents may be issued, which, when attached to a letter, in addition to the lawful postage thereon, shall entitle the letter to immediate delivery at any place containing 4,000 population or over, according to the Federal census, within the carrier limit of any free delivery office, or within one mile of the post office or any other post office coming within the provisions of this law, which may, in like manner, be designated as a special delivery office; that such specially stamped letters shall be delivered between 7 o'clock A.M. and midnight; that a book shall be provided in which the person to whom the letter is addressed shall acknowledge its receipt; that messengers for this special delivery are to be paid eighty per cent. of the face value of all the stamps received and recorded in a month, provided that the aggregate compensation paid to any one person for such service shall not exceed $30 per month; and provided, further, that the regulations for the delivery of these specially-stamped letters shall in no way interfere with the prompt delivery of letters as provided by existing law or regulations.

Primary Batteries.

A Chloris Baudet "unpolarizable" battery was tested at the Philadelphia Exhibition last year. The cell is described as follows: An outer rectangular cell, 22 cm. by 18 by 9, and a porous cell for the zinc plate. Two porous jars, one for crystals of bichromate of potash, the other for sulphuric acid; one with holes and the other without; two plates of carbon, each with suitable wire connections, and a suitable cover for the whole. The solutions used were a saturated solution of bichromate of potash for the outer jar holding the carbon, and a super-saturated solution of acid sulphate of potash for the porous jar containing the zinc. In the test cell the bi-sulphate of potash was used in the porous jar. When first set up this cell had an electromotive force of 1.87 volts. It was then put in circuit with a resistance of 5.8 ohms, including a galvanometer, when the deflection was 47°, with a current of .262 ampere. The internal resistance of the cell was 1.3 ohms, and the zinc was a half-inch rod immersed to a depth of about three inches. The needle fell one degree in the first five minutes, when after an hour it rose to 47½°, standing steadily for five hours; the next morning it was 45°. Here it remained practically constant for about 28 hours, when it suddenly fell.

*** In the transmitting instrument of Prof. Silvanus P. Thompson's telephone, the use of a tympanum to catch the sound of the speaker's voice is obviated by the employment of a funnel-shaped tube; and instead of the tension regulator or carbon button used by Edison, there is a metallic ball valve. This combination of a speaking tube with a ball valve to control the electric current is one of the most novel points of the new invention, and is as simple as it is novel. In the receiving instrument at present used the vibrating diaphragm consists of a piece of gold-beater's skin properly prepared, carrying at its center a bit of thin iron about as big as a thumb nail; this is placed in front of an electro magnet, which is excited by a current from a battery in the line wire.

.... The Western Union proposes to go on paying dividends, regardless of the reports that it isn't earning them. Stockholders are not apt to be over-critical when they get their money.

* * Dupre has succeeded in suppressing the nitrous vapors of the Bunsen battery by using a depolarizing liquid consisting of nitric acid, in which 75 grams potassium dichromate have been dissolved per liter. In contact with zinc he employs either acidulated water or potassium disulphate.

The First Telegraph Wire.

Capt. Moses Tower, of Hull, Mass., seventy-one years of age, but hale and hearty, relates the following interesting particulars of the first telegraph line constructed between his city and Boston in the summer and fall of 1843:

"Yes," said he, as he lit his pipe and calmly puffed away, "it was a very funny experience I had with the telegraph line. Why, you can have no idea of the difficulties which beset us every foot of the way, or of the foolish and superstitious fears which the people had of it—people who claimed to be intelligent and sensible, too. It was just forty-two years ago this coming summer. At that time Prof. Morse and his friends were urging Congress to make an appropriation to construct a line between Washington and Baltimore, which they got a year later. Colonel Sam Colt, who invented the Colt revolver, had failed up the year before. He had considerable leisure on his hands, and, like most inventors, naturally spent his spare time in studying up something new. He became interested in Prof. Morse's experiments, and, convincing himself that it was a valuable field for independent investigation, set to work to perfect some method of his own for transmitting the electric current. Then, as now, there was a signal station at Hull, established for the purpose of informing the members of the merchants' exchange of the arrival of vessels in the outer harbor. In foggy or bad weather the signals had to be sent to a relay station on Long Island head, and then repeated to Boston. Of course, this was very slow work; so, when Col. Colt unfolded his telegraph wire scheme to the members of the exchange, they gave him their support. Colt had hit upon a method of transmitting which he thought would do the work. The colonel engaged me to procure the posts, erect them and string the wires. I started from the signal station in Hull and strung the wires upon posts thirty-five feet high and 300 feet apart. The wire I used was altogether different from that used now-a-days. It was of copper, somewhat thicker than a darning needle, but very tough. Lamp-wicking was wound tightly about the wire, and the whole then dipped in tar. This was done because at that time it was believed that the wire would not work unless protected from the rain. I got along first-rate until it became necessary to carry the line underneath the water a distance of 900 foot, from Hull to Hingham. We believed that the wire must be kept dry or our work would go for nothing. In order to do this, I got enough ordinary lead pipe to reach across the river, through which I strung the wire. Then I had a submarine cable."

FRIGHTENED BY VILLAGERS.

"But after I got across to the Hingham side my troubles seemed to multiply. The villagers were deeply interested in what I was doing, but were terribly afraid that the wire would injure them and their property. Many were afraid to pass under it lest something, they knew not what, would come from it and strike them dead. Others did not want it near their houses or barns, having the idea that it would attract the lightning and set them on fire. In one place in Hingham, opposite the Old Colony House, I wanted to cross a field belonging to a Mr. Burr, but he refused to allow it. He had heard that if the line was put there he would not dare pasture his cattle in the field, that he would not venture to go into it himself to mow or send any of his help, and, finally, it would spoil the property and greatly lessen its value, and perhaps preventing his selling it at any future time. That is only a sample of the objections which were made and explained, but it was of no use. I had to go around and follow the roadway, and even here I met a great deal of opposition from the people in the way of having the poles I set up during the day sawed down at night. However, by great perseverance, I managed to get the line into Quincy, but, finding that there were so many people settled on the line between that town and Boston which we wished to follow, that we thought it best to negotiate with the Old Colony Railroad for the privilege of erecting poles along its line to the city, a distance of eight miles. We offered to put in instruments and provide operators in all the stations in Quincy, and maintain them free of charge for the use of the rail road. The directors of the road considered the matter. They couldn't see what use it would be to the road to have the instruments and operators, and finally concluded to ask $50,000 for the privilege. The price was altogether too stiff, so I followed the turnpike into Boston, where the citizens cut down the poles as they did in Quincy. You will laugh when I tell you how I secured the wire to the posts; but then it was the best that anybody knew how in those days. First I bored a hole down into the post from the top. Into this was placed a metal tube, on which was set a saucer-shaped insulator, with the rounding rim inverted. Above this was a pronged piece of iron set in the tube, around the tines of which the wire, bared for the purpose, was given three or four turns. Covering the whole, and particularly to protect the bare wire from the rain, was another saucer-shaped insulator or cup. It was very funny to hear the comments of the people when they saw how we twisted the wire into the prongs of the insulators. They had an idea that the letters of the alphabet were actually sent through the wire, and it was a great puzzle to them to know how these letters could turn the sharp corners of the insulator. We grounded the wires in a way which would seem curious to electricians of to-day. A piece of copper was tied to the end of a copper wire, and lowered to the bottom of an old well in Hull. People could not see through this either, and many of the more superstitious thought there was some magic about, which increased their fear. But, after a time, in spite of the great opposition, the line of telegraph was finished, greatly to the satisfaction of a few, and particularly to myself. I think it was on December 10, 1843, when the final connection was made, and a message received over the line from Hull. But that very night a heavy northwest storm came up and blew the line down in exposed places in Hull and elsewhere, and the enterprise had to be abandoned. Col. Colt was almost heartbroken, while his purse was empty. I know for a fact that he had to pawn his coat in order to get away from the city and return to Hartford. It was hard on me, too, for I lost $1,500 on my contract. I cannot help reflecting," said the old captain, as he looked out of the window and brought his story to a close, "when I look at the network of wires overhead in Boston to-day, and then think of the extreme difficulty I had forty odd years ago in getting a single wire into the city, that the world moves in spite of the opposition of people generally to new things, and I suppose will continue to move against some kind of opposition like that I have told you of, till the end of time."

.... The line of military telegraph between Cairo and Korti, 1,123 miles in length, seems to be both efficiently worked and maintained. The principal stations are Cairo, Assiout, Assouan, Korosko, Halfa, Dal, Dongola, Debbeh, and Korti, while branch stations have been opened at Shellal, Gemai, Serras, Mohrit, Ambigole, Akasha, Abu Fatmeh, and Merawi. Between Assiout and Assouan, a distance of 320 miles, translaters are in use, and these are worked with about 30 volts, a fact which speaks well for the insulation of the line.

.... The London *Electrician*, speaking of the National self-binding insulator, says: "This insulator possesses certain new features which appear to be of greater practical value than any improvement made in glass insulators since the introduction of the internal screw thread. The improvement enables the ordinary tie-wire to be wholly dispensed with, the insulator, with its clip, being so formed that the line-wire is readily placed in position, and rigidly secured without the aid of tools. The insulator can be applied in any position, wherever the ordinary pattern is available."

.... The Cairo correspondent of the *Daily Telegraph* says: The greatest regret is expressed here at the decision to refer the settlement of the dispute about the payment for the military use of the Soudan telegraphs to arbitration, and it is considered that an exhibition of vigor by England would be very opportune.

.... The laying of the submarine cable connecting Lloyd's signal station on the Fastnet Rock with the mainland at Crookhaven has been successfully accomplished. Vessels which pass this station and wish to be reported can now be signaled and reported by telegraph direct from the signal station on the Rock.

.... Judge Phelps, of Baltimore, after hearing all the arguments on the petition of Receiver Francis P. Stevens, of the Postal Telegraph and Cable Company, that his rival Receiver T. Wallis Blackistone be adjudged guilty of contempt of court, dismissed Receiver Stevens' petition. Mr. Stevens was appointed receiver two weeks ago by Judge Phelps. Subsequently Mr. Blackistone was appointed receiver by Judge Duffy. Mr. Blackistone gained possession of the office and turned out the manager and employees appointed by Mr. Stevens. Mr. Stevens then got an injunction against Mr. Blackistone from Judge Phelps. Mr. Blackistone disregarded the restraining order and still held on to the office, whereupon Mr. Stevens instituted the contempt proceedings. Judge Phelps yesterday said that he did not want to decide at this point the whole question as to who is the proper receiver. He thought, however, that Mr. Blackistone was guilty of an error of judgment, but not of contempt of court.

.... The following is the official report of the Western Union Telegraph Company for the quarter ending June 30: "Surplus January 1, 1885, as per last quarterly report, $4,231,667; net revenues, quarter ended March 31, 1885, $1,358,876; total, $5,590,543; from which deducting appropriations for dividend of 1½ per cent., paid April 15, $1,199,841; interest on bonded debt, $123,768; sinking funds, $19,991; total, $1,343,600; leaves a surplus April 1, 1885, of $4,246,943. The net revenues of the quarter ending June 30, inst., based upon nearly completed returns for April, partial returns for May, and estimating the business for June, will be about $1,400,000. Add surplus April 1, as above, $4,246,943; total, $5,646,943; from which appropriating $123,768 for interest on bonded debt and $20,000 for sinking funds, leaves a balance of $5,503,175. It requires for a dividend of 1½ per cent. on the capital stock $1,199,841, deducting which leaves a surplus, after paying dividend, of $4,303,334. It was resolved that a dividend of 1½ per cent. be paid on and after the 15th of July next, and that the books of the company be closed at 3 P. M., June 20, and reopened on the morning of July 2."

.... The Elmira *Advertiser* approves the recent extension of the Western Union facilities to the newspapers belonging to the Associated Press, by referring to the time when a few malignant and excited New York journals did their worst to stimulate mob violence against the Western Union building and its officers. The *Advertiser* says: "The scene around the office of the Western Union building in New York on election night last fall is another illustration of the prevailing ignorance in regard to the relations between the Associated Press and the Western Union. At one time there was fear that the office would be mobbed and the building fired. But it should be remembered that the outlaws who were eager to start a riot on that occasion cared nothing at all about the result of the election. What they wanted was to get up a great disturbance so they could pick pockets, steal and plunder. They, however, heard the outcry against the Western Union—an outcry that was extremely wicked—and they took advantage of it to gather in front of the Western Union building in the hope that a riot would be started in some way. Fortunately, their wish was not gratified and the peace was not broken. Hereafter the Western Union will have no cursing of that kind to bear."

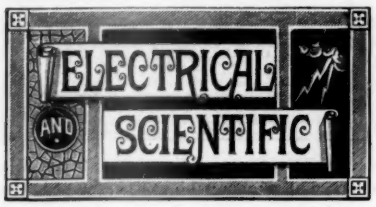
TELEGRAPHIC

.... The German Government has discharged all women who were employed in its postal, telegraph, and railway service as clerks and in other capacities. As during the last twenty years they nearly monopolized such services in some towns, much suffering has ensued among the discharged. The motive alleged is that women are unfit for such public service.

.... A severe storm on the line of the Union Pacific Railway some 100 miles west of Omaha, June 13th, destroyed several miles of line, and leveled 175 poles. Both the railroad and Western Union lines were completely broken down. A train of material was started the next day, and the trouble remedied with the despatch that characterizes all the work in Superintendent Dickey's district.

.... The first section of the bill to secure greater care in the transmission of telegraphic messages was amended by the Massachusetts Legislature to read as follows: "All persons, associations and corporations engaged in the business of transmitting or receiving telegraphic messages for hire shall be liable and responsible to an amount not exceeding $100 in any case for all damage caused by their negligence, or that of their servants or agents, in transmitting, receiving or delivering such messages and shall not be liable therefore beyond the sum of $100 except by special contract." An amendment offered by Mr. Milliken to strike out the world "exclusively" from the third section relating to telegraphic business carried on by railroad corporations was also adopted, and the bill as amended was engrossed.

.... Extensive preparations are being made by the post office authorities of England for the new system of sixpenny telegrams. The extensions have been made on the basis of an estimate that the reduction in tariff will cause an increase of the business of the department to the extent of 30 per cent. within the first year, and the extra expenditure already incurred amounts to half a million sterling. Of this amount £475,000 has been spent on new plant—poles, wires, instruments, etc., whilst £25 000 has been laid out in the erection of new buildings. This comparatively small proportion for the latter purpose is due to the fact that accommodation for future development had already been provided in most of the post offices built or extended within the last two or three years, including those at London, Manchester, Bradford, York, Exeter, and Plymouth, Glasgow and Aberdeen, Cardiff, Dublin, Belfast and Cork. The length of public road upon which new poles have been erected in England is 850 miles, apart from the extension on railway routes, and upon these poles there have been placed 9,200 miles of new wires, in addition to which there are about 11,600 miles of new wires put up on existing road or railway poles. Three new trunk lines have been formed, each with branches at various points from the main circuits. Similar extensions on a somewhat smaller scale have been made in Scotland and Ireland. A number of new three-wire submarine cables, for service under channels, rivers, and lakes, have also been provided for the convenience of the Isle of Man and the Orkney and Shetland Islands. In London the number of offices at which the pressure of business is met by the use of pneumatic tubes, will be increased by the use of an additional length of 7,500 yards of tube. Among the additional instruments purchased are 40 Wheatstone automatic, eight quadruplex, 300 duplex sounders, 350 single sounders, 150 single needle machines, and 10 extra repeaters. The duplex system will be completed in the case of 100 circuits. The staff throughout the kingdom will be increased to the extent of 1,200 new telegraphists and over 1000 messengers.



* * The number of persons killed by lightning in France since 1835 is 4,609. During thirty years—that is to say, since 1854—2,222 men and 929 women have been destroyed.

* * The Thermo-Tricycle Company, of East St. Louis, has been incorporated with a capital of $100,000 to construct and place on the market a motor for propelling road vehicles and small boats. The incorporators are Benj. Bragelle, F. C. Garbutt and O. L. Geer.

* * The Geographical Society of Paris has awarded a gold metal (La Rouquette's prize) to the Danish Government publication on Greenland, "Meddelelser om Gronland," in which are from time to time recorded the results of the Danish scientific expedition exploring Greenland.

* * The Norwegian Government have decided to dispatch an expedition to Finmarken for the purpose of effecting hydrographic researches and soundings along the coast. Among the various grants by the Swedish Government for scientific work is a sum of $200 toward the expenses of Mr. O. Nordstedt's algological labors in England and Scotland this year.

* * Herr Fleitmann, of Iserlohn, has shown that pure nickel and its alloys with copper, cobalt, and iron can have other metals added without losing the property of being welded, and, therefore, can still be used for making plate. The metals which can be added in this way are zinc, tin, lead, cadmium, iron, and manganese up to as much as 10 per cent.

* * Mr. Wolff's treatment of writer's cramp seems to be making steady progress in popular estimation. It consists, as formerly described, of a combined application of massage, gymnastics, and caligraphic exercises. Any sufferer from that annoying and distressing species of cramp can devise a special system of relief by noting the objects aimed at by the method adopted by Mr. Wolff.

* * In a recent French publication there appears a note that the results of the transit of Venus are now being worked out from the photographs or daguerrotypes taken in 1874. When people talk of the astronomical calculations, they have no idea of the length of time that is required to work up or work out the results of photographic observations, which are sometimes kept for twelve to twenty years before the results in all their bearings are actually known.

* * A new departure in military signaling has been made by Mr. Eric S. Bruce, of England, son of the late General Michael Bruce, who commanded the Grenadier Guards. He places an incandescent lamp in the body of a translucent captive balloon, and flashes signals according to the Morse code by making and breaking contact, thus permitting signaling to be carried on at great altitudes and to considerable distances. Mr. Bruce is experimenting with various lamps and batteries, so as to determine those best suited to his purpose, and he will describe the invention at his forthcoming lecture at the Birkbeck Institute.

* * A number of interested capitalists were attracted to the Greenville works of Professor Leo Daft by the shipment of the electric motor "Morse" to Baltimore, where it will arrive this week. Several of Professor Daft's employes accompany the motor, which will be put into operation on the tracks of the Baltimore City Passenger Railroad Company. The "Faraday," twin to the "Morse," will be sent to Baltimore in a few days. The tracks of the Ninth Avenue Elevated road are not quite ready for the reception of the "Ben Franklin," said to be the largest electric motor in the United States, although they will be ready during the present month.

* * The Daft Company still assert that they will, some time in the dim futurity, place their electric motor on the Ninth Avenue Elevated, this city. We certainly hope they will, for there has been enough said about it to lead every one to expect it. We learn that their new electric engine is now receiving its first coat of vermilion.

* * A new street-car motor made a trial trip on a specially constructed track, in the yards of the Cooper's Point Iron Works in Camden, Pa., recently. The motor is operated by means of a gas engine of 20-horse power. Among the original features of the motor are the automatic feet, which are said to act upon the principle of the action in a horse's front legs. They are beneath and extend to the center of the motor, and are to be used at grades and slippery places, where the wheels slide.

* * The Indian Museum Department of the International Exhibition, London, was destroyed by fire June 12th. The only articles saved were those comprising the contribution of the Prince of Wales. The Indian Museum contained many costly and rare models of Indian workmanship. These were chiefly supplied from the South Kensington Museum, and the impossibility of duplicating them makes their destruction a very serious loss. The damage to the Inventions Exhibition Building is of a trifling character.

* * London *Engineering* says that Mr. P. Manhes has taken out patents for a process by which he claims to extract gold and silver from copper mattes. The mattes are roasted, after grinding, with from one to three per cent. of ammonium chloride, in a muffle-furnace. The heat is to be kept so low that the matte does not get red hot, but all the ammonium chloride must be driven out. After this the matte is not altered in appearance, but all the gold and silver are present in the form of chlorides, while the iron and copper remain as sulphides. The chlorides of the precious metals are then to be extracted by one or other of the well-known solvents, sodium hyposulphite being specially recommended.

* * The project of a tunnel under the Straits of Messina, to connect Sicily with Italy, is an enterprise which has long received the attention of engineers and been recommended by scientific experts. Recently, however, a Piedmontese company has come forward with a counter project for a bridge, an enterprise which, it is remarked, will, if ever carried out, constitute as remarkable a work of the kind as there is in the world. According to the published statement, the width of the strait at its narrowest point is about two miles, but, owing to the great depth of the water—more than 500 feet—on this line, the projectors propose to locate the bridge where it would have a length of about two miles and a half. The plan of this gigantic structure involves four piers, connected by spans of five-eighths of a mile in length, the two shore arches having half the span of the three central ones.

* * Probably the most wonderful timepiece ever heard of is a clock described by a Hindoo Rajah as belonging to a native princess of Upper India. In front of the clock's disk was a gong, swung upon poles, and near it was a pile of artificial limbs. The pile was made up of the full number of parts for twelve perfect bodies, but all lay heaped together in seeming confusion. Whenever the hands of the clock indicated the hour of one, out from the pile crawled just the number of parts to form the frame of one man, part joining itself to part with a quick metallic click, and when completed the figure sprang up, seized a small mallet, and, walking up to the gong, struck one—the first hour. When two o'clock came two men rose up and did likewise; and so through all the hours of the day, the number of figures being the same as the number of the hour, till at noon and midnight the entire heap sprang up, and marching to the gong, struck one after another each his blow, making twelve in all, and then fell to pieces again.

* * The third rail for the Edison-Field motor (for the return of the electricity to the original reservoir) is on the track of the elevated road from Sixty-third to Eighty-ninth Streets, 300 tons in all, and the other 500 tons are ready to lay. The middle rail will be supported on glass cups like a telegraph wire, completely insulating it, and these have just come from Pittsburgh. The competition between the Edison-Field and the Daft electric systems will be watched with lively interest.

* * During the thunder-storm on Friday lightning struck the summit of the Washington Monument, and an unusually heavy report followed. The aluminum point had been struck four times previously, but the fluid was noiselessly carried off by the arresters. A elescopic examination afterwards disclosed the fact that Friday's disruptive charge had shattered the capstone, and that the underlying stone had been badly cracked. The aluminum apex and interior of the monument are uninjured.

* * A piece of steel bar, square, ⅜ inch diameter and 2 inches long, worth perhaps ½ cent, can be increased to more than forty times its initial value by labor. A single blow of a drop hammer on the heated steel punches the central portion against the sides and forms the steel into a hollow parallelogram; another blow forms the outside, so that the square ends become rounded or shaped like the bows of a boat; a final blow completes the shape into that of a sewing machine shuttle. The forging is then placed in a die under a powerful press to compact its substance, is finished on a buff wheel, is drilled, fitted with a tension spring, and is ready for sale, bringing at wholesale from 20 to 30 cents.

Lightning's Freaks.

When lightning struck Jefferson Sweatman of Alpine, Ga, it broke his neck.

When lightning struck the livery stable of J. L. Griggs of Macon, Ga., it killed but one horse, but selected the most valuable animal of the collection.

Eighteen sheep belonging to Hermann Trellman of Troy, Me., took refuge under an oak during a storm, and a single lightning bolt killed the entire flock.

Elmer Swaisgood of Plymouth, Ind., was walking about his garden just before a storm, when lightning struck him, killed him, and then burned the clothing from off the body of his mother, who sat near by.

Three little boys of Lancaster went fishing in Cayuga Creek. A storm coming up they started home on a run. The smallest of the trio couldn't get along very fast and a lightning bolt caught and killed him. His two comrades were his pallbearers.

A lightning bolt entered the house of Abe Winglee of Oakland, Ill., through the sitting-room window, firing the building and instantly killing Mrs. Winglee and fatally injuring her sister; and yet the four children who were present escaped all injury.

Six employees were on the Keystone bridge at Henderson, Ky., during a storm. All would have escaped the lightning, which struck the bridge, if one named Moore had not stood close against an iron column for shelter. He was injured so that he will die.

Mrs. Hannah Mansoon of Henderson, Ky., recovered from a lightning stroke, but the resuscitation was excruciating. The sensations, she said, were as if she was being jabbed by ten thousand needles, while a knife blade was being twisted in her brain.

Thomas Maloney, of Chattanooga, Tenn, was running along a railroad track seeking shelter from a thunder storm when lightning struck the steel rail, entered his body at the heel, and passed entirely through to the top of his head, cutting out completely the crown of his hat. He fell dead instantly.

Lightning fired a pistol with serious results at Dalton, Mo. Andrew Clarkson had been examining the pistol, with a view to repairs, just before he retired, and the hammer could not be moved, owing to rust. He then laid it on a table near his bed. He awoke about midnight, feeling a stinging sensation on his hand and thigh, and hearing a fearful crash of thunder. It was found that the pistol had been discharged by the electricity, and the ball went into Clarkson's body.

When the body of Thomas Winn, a sheep raiser of Yreka, Cal., was found after the thunder storm of Wednesday, the only clothing upon it was on the arms. The flash struck him upon the head and passed through the body into the boots. It tore away every particle of hair from his head, and scattered it about, cut his boots into shoestrings and threw the remnants twenty feet away. His clothing went the way of the boots, but the electricity seemed to have spared the two arms.

Patrick Cox, of Callicoon, N. Y., has nine children. Eight of them sleep in a room in the upper story of the house. Early on Friday morning a heavy thunder storm passed over the place. Lightning struck Cox's house in the middle of the roof. The bolt entered the room where the children were sleeping. James, aged 15, was thrown out of bed and clear across the room. A table was hurled from one side of the room to the other. The partition wall between the room and another was entirely demolished, and the stairs leading from the kitchen were torn into splinters. A boot that lay on the bedroom floor had the sole torn off of it, and a hanging lamp, a clock, and a cupboard filled with dishes were thrown in a heap on the floor. Six of the children were made unconscious, but they recovered in a few hours. Ten feet of the roof was knocked off, and not a particle of the debris can be found.

A Boom in Lightning Rods.

The committee of scientists who examined the Washington Monument after it was struck by lightning, have not yet made a formal report of the changes they deem desirable to prevent a similar accident. As it is known, however, that their principal recommendation will be to supply additional points on the roof of the monument for the lightning to strike, Col. Casey decided to take immediate steps for temporary prevention from lightning, fearing that a chance bolt might strike the monument again and cause even more damage before the entire changes which might be recommended could be made. With this view, after submitting his plan to one of the committee, who immediately approved it, as it was in the direct line of the intended recommendations, Col. Casey went to Philadelphia, and ordered four copper rods, three-quarters of an inch in thickness, which are to extend to the outside of the roof of the monument, one for each fall of the roof, and to be in direct connection with the four copper rods which extend from the iron pillars which compose the framework of the elevator to the base of the capstone. The four additional rods will each terminate in seven branching gilded needle points. It has been determined by experience that the interior lightning rod apparatus is capable of conducting all the electricity that could possibly come from any storm, and, with the additional outside facilities, it is thought that all danger from lightning will be averted. There will be with the aluminum tips, 29 lightning rods on the roof of the monument for the lighting to strike and be conducted thence without damage into the ground. Workmen are now engaged in constructing a scaffolding to surround the roof, and it will be in place by Thursday, when the rods are expected to arrive. Unless some unforeseen accident interferes the new lightning rods will be in place and ready for duty by Friday night. In case the committee has any additional recommendations, they can be carried out without interfering with the precautions taken in advance. Since the accident occurred, Col. Casey has been daily receiving communications from every part of the country giving advice and recommendations for the future protection of the structure. Probably every lightning rod agent in the country has written to Col. Casey in glowing terms of the peculiar advantages of his rod, which, if placed upon the monument, will

insure safety in the future. Many of them evidently believe that nothing has ever been done to prevent the monument from being struck. Some of the recommended preventives are ridiculous. An anonymous letter received advises that the entire roof be covered with metal, and that the covering project 10 inches beyond the faces of the shaft, so as to ward off the bolts from them.

Thermo-Piles at the Philadelphia Exhibition.

At the late exhibition, two forms of thermo-piles were exhibited — one of the Clamond and one of the Noe-Rebicek pattern. The first of these consisted of pairs of iron and an alloy of bismuth and antimony, arranged in rings. There were 14 rings of 11 pairs each—154 pairs in all. The examining committee found the battery to give an electromotive force of 3.02 volts, and to have while hot an internal resistance of 2.2 ohms. The Noe-Rebicek is a more recent battery. In this there were 20 pairs of elements, consisting of German silver and an alloy of zinc and antimony. The elements are arranged horizontally and radially at the top. The heat from the flame comes to the joints through a short, thick copper wire, which is expo ed to the flame. The central disc, against which the flame strikes, also imparts its heat to these copper conductors, which point directly toward it and surround its entire circumference. The elements rest on a stiff insulating ring, which carries a series of vertical cylinders. These are rolls of sheet copper, and their object is to conduct the heat away from the elements and to convey it to the surrounding atmosphere. The elements are thus heated by a single Bunsen flame in an economical manner. Of the two batteries of this pattern tested by the committee, the larger had an electromotive force of 1.94 volts, or nearly one-tenth of a volt per pair. The smaller one gave 1.73 volts. The internal resistance of the larger was .5 ohm, and the smaller, .8 ohm. The committee states that the Noe-Rebicek pile has the highest electromotive force of any similar battery that has been made on a commercial scale, and seems a long step away from the ordinary bismuth-antimony pile, and toward a thermopile that may be used as a substitute for the common galvanic battery.

The fight between the Anthracite Electric Light Company and the gas company of Pottsville, Pa., for the lighting of the borough, has awakened the interest of other electric light companies. At the meeting of the Council a proposition was presented to light up the borough by the Van Depoele system. The proposition is as follows: The company to erect seven towers, at different points about town, 125 feet high, each tower to contain six lights. They are to burn all night. The company guarantees to light up the entire town with these seven towers, which will cost the borough about $6,000 per year. Mr. Geo. S. Bowen is looking after the interests of the Van Depoele Company, and on this occasion addressed the Council in behalf of his proposition. The Council appointed a committee of five to investigate the matter.

The telephone transmitter which S. Prentiss Nutt, Natchez, Miss., has patented, consists of a variable rheostat, comprising of a column of conducted liquid which constitutes a fluid electrode, and which is made to rise and fall under the action of the sound in combination with a stationary opposing electrode. The transmitter will prove especially valuable in conducting conversations at long range.

—— The Cleveland Electric Light Company have put in two additional dynamos and a third Westinghouse Automatic Engine.

—— The Jamestown Gas Company., of Jamestown, N. Y., are preparing to introduce incandescent lighting into the business portion of the city. The system to be adopted is now under advisement, and the whole matter, both as to electric installation and the steam power, is in the hands of their consulting engineers, Messrs. Westinghouse, Church, Kerr & Co., of New York.

—— It is said that satisfactory progress is being made by the American and Edison companies for the installation of a large central lighting station of the Edison system in Boston. It is expected it will be built with a capacity of from 10,000 to 15,000 lamps.

—— The Kayser Electrical Company has been formed with headquarters at Elm street this city, for the purpose of handling all kinds of incandescent lamps, and for the manufacture of electrical instruments. The members of the company are Hugo Kayser, J. S. Bihin and H. Delehantey.

—— The Faraday Electric Company has been incorporated for the purpose of producing electricity, and using it to illuminate streets and buildings and for heating and power purposes. Its capital stock is $100,000, divided into 4,000 shares, and its incorporators and trustees are Sidney F. Shelburne, Edward Barr, George L. Weed, G. Victor Powell, and Theodore F. Reed. Its manufacturing business is to be carried on in Jersey City.

—— An ordinance granting the Thomson-Houston Electric Light Company permission to extend their wires and poles on Fairmount Avenue and Spring Garden Street, between Sixth and Broad Streets, was favorably reported yesterday by the Electrical Committee of Councils, Philadelphia. A week ago the Mayor vetoed an ordinance granting similar privileges to this company. The committee also favorably reported an ordinance to allow the Frankford Electric Light Company to erect wires and poles in Frankford.

—— The work of laying the conduits for the electric lights in Fairmount Park, Philadelphia, will begin in a few days, and the lights will probably be burning before the close of the month. The Cosmopolitan Electric Light and Telephone Company has charge of the work. The lights will be kept burning without expense to the Park Commission for one year. At the end of that time they will be taken down unless the Park Commission agrees to pay for them. The company, in case the commission is not satisfied with the lamps, agrees to remove them and to restore the grounds to their present condition. The plans show that twelve lamps will be erected. Each of these will be suspended from an ornamental post about fifteen feet high. Four lamps will be located in the space between Green Street and the Lincoln Monument. The river walk in front of the boat-houses will be illuminated by four lights. The remainder will be placed along the drive between the monument and the Girard Avenue Bridge. The conduits will be oval in shape, and will be laid at a depth of eighteen inches.

—— The annual report of the Middlesex Electric Light Company, of Lowell, Mass., was made May 31 for the fiscal year ending that date. The whole amount of money received during that time from all sources was $43,407.66, and of this $38,406.94 was received for electric lighting. There are at this date 235 electric lights in use: 60 on poles in streets, and 175 in stores, offices, and public buildings. Whole number of shares of stock, 15,000, at a par value of $10 each. Stock sold and issued to stockholders, 13,106 shares. Stock in treasury remaining unsold, 1,894 shares. The following statements show the condition of the company from its beginning. As will be seen, the net earnings for the year ending May 31, 1885, were $11,497.90, or $8\frac{7}{10}$ per cent. on the shares issued, or $7\frac{6}{10}$ per cent. on the total capital stock. No dividend has been declared, the board of directors having deemed it an imperative necessity for the future welfare of the company to improve the plant and construction account, and the $11,497.90 earned during year has been spent as follows:

Plant account	$6,399.65
Construction account	1,115.05
Interest account	2,071.33
Real estate account	132.19
Temporary loans of former years.	1,000.00
General expense account	616.10
Cash on hand	163.58
Total	$11,497.90

—— The electric light works at Lockport, N. Y., are being enlarged.

—— All the important thoroughfares of Brooklyn are to be lighted by electricity, the trial given this illuminant in some portions of the city having convinced the city fathers that this was the light for them.

—— A letter from a gentleman in London says: "I have just returned from the Exhibition of Inventions at South Kensington, and I must confess the Armington & Sims engine is one of the most complete engines I ever saw."

—— Messrs. Ballou and Bailey, of the Thomson-Houston Company, Chicago, were in New York last week, and report business good with them. They have just completed arrangements with the city authorities of Bloomington, Ill., for the placing of a plant of 100 lights in that city under a three-year contract.

—— The electric light plant at Bar Harbor, Me., built by the American Company and run last year, was sold to the Lewiston and Auburn Electric Light Company, one of the subsidiaries of the American, and worked very successfully. The Lewiston and Auburn Company is increasing the capacity of the plant this year, and it is expected the station will be opened in a few days, with a capacity of nearly 100 lights.

—— The Forest City Carbon Manufacturing Company, of Cleveland, is meeting with splendid success. Although they have been in business for less than three months, they have been compelled to enlarge, and their capacity, which was formerly 200,000 per month, will be increased to 600,000 per month. The new factory is 50 by 100 feet. Messrs. Holmes, Booth & Haydens are handling this carbon, which fact in itself is proof that it is first-class. The carbon, wherever it has been tried, is spoken of in most favorable terms.

—— Speaking of dust explosions, says the *Milling World*, a case from Germany is worthy of notice. A sack of flour, falling down-stairs, opened and scattered the contents in a cloud through the lower room, where a burning gas flame set fire to the dust, causing an explosion which lifted a part of the roof of the mill, and broke almost all the windows. There can be no doubt that the majority of dust explosions are, like mine disasters, due to open lights; and as this danger can be practically avoided by the use of the incandescent electric light, there really seems to be no valid reason why it should not be introduced more generally, as those establishments which have used it express themselves in its favor.

—— In an article entitled "A Monster Day at the Inventions," the London *Daily News* says: "In due time the conservatory and main buildings were suddenly outlined with what seemed to be small copper nails, and, when the nails grew as by magic into bright lamp lights, a roar of surprise and admiration drowned the music of the bands. This marvelous electrical illumination is not literally effected instantaneously. The installation throughout the grounds consists of twenty-three circuits, made into eight sections, and to each section there is a switch controlled by Sir Francis Bolton or his assistant in the clock tower. First, therefore, to appear were the glow lamps at the upper end; then in quick succession followed those of the main buildings, trees and flower beds. The general effect was enthusiastically recognized. The illuminations are, as we learn, however, still in the experimental stage. These 20,000 glow lamps almost simultaneously starting into light are a marvel of electrical progress; but as they never twinkle, and are necessarily arranged with regularity of line and pattern, they have somewhat, as a general design, the prim - mality of an Italian garden. Colored lanterns suspended from the branches would supply the small effect that is wanting for perfection. Last night, however, the lamps and the lovely fountains, as they were, proved all-sufficient in affording pleasure. It was, under all the circumstances, a grand day at he Inventions.

ELECTRIC LIGHT NEWS

—— The Badger Electric Company, of Chicago, filed a certificate of increase of their capital stock to $100,000, June 1st.

—— Eighty incandescent and 25 arc lights are to be placed in the Pittsburgh Post-Office in a short time, which will be a welcome improvement in the way of light to the employes.

—— Certain citizens of Albany have brought suit to annul the electric light contract with the Albany Electric Illuminating Company, alleging that the contract was made contrary to the charter.

—— The Pittsburgh Post-Office is noted as being the gloomiest building imaginable for the purpose, and the citizens will hail with pleasure the completion of the new Government building, now in course of erection.

—— The Brookline (Mass.) Electric Light Company, the plant for which is now under construction by the American Electric Manufacturing Company, will be ready to commence operations on the 1st of July. As in other places, this company bought the land, erected the buildings and own the whole property. The capacity of the plant is 100 lights, and the company commences with a city contract for 50 street lights.

—— A decided improvement in the manu facture of carbon by the use of natural gas has been successfully made by the Pittsburgh Carbon Company. This result has been reached after repeated experiments, and the company is now turning out its entire product by the use of this new and excellent fuel. A greater uniformity, durability of life, and much steadier and whiter light, it is claimed, are attained than is possible by the fuels heretofore used in the carbonizing process.

—— Having regard to our remarks on this subject in our last issue, the *Tecnomasio Italiano*, of Milan, write to inform us that since the month of November, 1884, the steamboat Regina Margherita, belonging to the firm of Rocco, Piaggio & Sons, of Geneva, has been successfully and efficiently lighted by a combined system of 100 sixteen candle-power incandescent and four arc lamps, the latter being placed in multiple arc with the incandescents, and regulated by a series of resistances. These lamps are all served by a machine manufactured by our informants. The same system was employed by the *Tecnomasio Italiano* during the winter of 1884 for the illumination by arc lamps of the Theater of La Scala at Milan. In this installation the dynamo served at the same time eight arc lamps in multiple arc, and a certain number of incandescent lamps of 100 volts. The difference of potential in this case was reduced by means of the resistance furnished by the 100-volt lamps, of which the number varied according to the intensity of the arc it was wished to form. When the carbons were in contact, the incandescent lamps were at 100 volts, but as soon as the carbons were parted they fell to an incandescence corresponding to about 50 volts. In point of fact, the resistance of each circuit remained constant, whether the arc was formed or not. With this system, when an arc had to be extinguished for the requirements of the service, by approaching the carbon to a point of contact, the other arcs which remained in action experienced no variation whatever by reason of the incandescent lamps acting automatically as resistances, and the quantity of current passing in any portion of the circuit underwent, practically speaking, no perceptible alteration. We are further informed that the above arrangement is due to Mr. Emilio Cabella, a young electrician of Milan. The installation at La Scala Theater has given such satisfaction that the management have decided upon the final adoption of the electric light.—*London Electrician.*

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JUNE 9, 1885.

319,447 Insulator; George L. Bromhall, Paterson, N. J.

319,534 Circuit closer for primary electric clocks; William T. Weisgerber, New York, N.Y.

319,536 Method of making electrical conductors; John J. Williamson, Boston, Mass.

319,539 Electric lamp; Leonidas G. Woolley, Indianapolis, Ind., assignor to the Woolley Locomotive Electric Headlight Company, same place.

319,540 Dynamo electric machine; Leonidas G. Woolley, Indianapolis, Ind., assignor to the Woolley Electric Headlight Company, same place.

319,548 Telephone transmitter; Alfred Berthron, Paris, France.

319,573 Electric lighting apparatus; Horace B. Gale, Natick, Mass.

319,578 Dynamo electric machine; George A. Hamilton, New York, N. Y., assignor to the Western Union Telegraph Company, same place.

319,580 Incandescent electric lamp; Louis Heinze, Newark, N. J.

319,627 Electric primer; Samuel Russell, Brooklyn, assignor to the American Electric Arms and Ammunition Company, New York.

319,628 Electric cartridge; Samuel Russell, Brooklyn, N.Y.

319,629 Electric cartridge; Samuel Russell, Brooklyn, assignor to the American Electric Arms and Ammunition Company, New York.

319,633 Torpedo boat propelled and steered by electricity; Winfield S. Sims, Newark, N. J.

319,635 Automatic cut-off for batteries; Leon Soulliere, Chicago, Ill., assignor by mesne assignments of one-half to William Reetz, same place.

319,687 Process of electro-depositing copper; Moses G. Farmer, New York, N.Y.

319,718 Automatic responding instrument for electric circuits; Alfred G. Holcombe, New York, N.Y., assignor to the Equitable Electric Company, same place.

319,745 Electric arc lamp; Henri Pieper, Fils, Liege, Belgium.

319,781 Electric arc lamp; August Bossard, New York, N.Y.

319,782 Electric programme signal; Rufus B. Carr, Boston, Mass.

319,789 Telephone switch; Henry W. Comstock, Red Oak, Iowa.

319,795 Process of smelting ores by the electric current; Eugene H. Cowles and Alfred H. Cowles, Cleveland, Ohio, assignors by direct and mesne assignments of four-tenths to Edwin Cowles and Charles F. Mabery, both of same place.

319,818 Watchman's time recorder; Albert Howard, Boston, Mass., assignor to the E. Howard Watch and Clock Company, some place.

319,855 Printing telegraph; George B. Scott, Brooklyn, assignor to the Western Union Telegraph Company, New York, N.Y.

319,856 Telephone exchange system and apparatus; Frank Shaw, New York, N.Y., and William A. Childs, Englewood, N.J.

319,898 Electric firearm; Joseph W. Frost, New York, N.Y.

319,912 Electric engine; William A. J. Kohrn, San Francisco, Cal.

319,927 Telephone transmitter; S. P. Nutt, Natchez, Miss.

319,945 Electric smelting furnace; Eugene H. Cowles and Alfred H. Cowles, Cleveland, Ohio.

BUSINESS NOTICE.

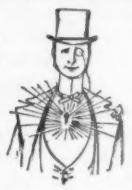
Wanted—A situation in an incandescent lamp factory or laboratory, by a gentleman experienced in making lamps and calibrating instruments, etc. Address L. G. T., box 861, Hartford, Conn.

The advertiser, who is thoroughly conversant with the manufacture of incandescent lamps, wishes to meet with parties desiring to manufacture the same. The best of references and testimonials given. None but principals treated with. Address A. B. C., care ELECTRICAL REVIEW, box 3329, New York.

Telephone Stocks
—AND—
Chicago Local Stocks & Bonds
BOUGHT AND SOLD
On Commission by the Undersigned.
S. G. LYNCH,
144 La Salle St., Chicago (formerly Lynch & Banta).

Telegraph and Electrical SUPPLIES
Medical Batteries, Inventors' Models, Experimental Work, and fine brass castings. Send for catalogue C. E. JONES & BRO. Cincinnati, O.
It is important to us that you mention this paper.

INCANDESCENT
Electric Lamps
FOR USE WITH BATTERIES.
Electric Light Scarf Pin, Complete, $1.75.



Electrical Supplies
OF EVERY DESCRIPTION.
Call Bells, Burglar Alarms, Etc.
ESTIMATES FURNISHED.
First Class Goods. Low Prices. Highest References.
41 Ann Street, Greenfield & Klein, New York.
Electric Light Contractors.
Authorized by the Edison Company.
Send for Illustrated Catalogue.

CORNELL UNIVERSITY.
Courses Leading to Degrees.
ELECTRICAL ENGINEERING,
CIVIL ENGINEERING,
MECHANIC ARTS, MATHEMATICS,
ARCHITECTURE, AGRICULTURE,
ARTS, ANALYTICAL CHEMISTRY,
CHEMISTRY and PHYSICS,
HISTORY and POLITICAL SCIENCE,
LITERATURE, NATURAL HISTORY,
PHILOSOPHY, SCIENCE,
SCIENCE and LETTERS.
Entrance Examinations Begin at 9 A. M., June 15 and Sept. 15, 1885.
For the UNIVERSITY REGISTER, giving full information respecting admission, free scholarships, fellowships, expenses, etc., address
Treasurer of Cornell University,
ITHACA, N. Y.

OKONITE
NEW YORK INSULATED WIRE AND VULCANITE CO.,
13 Park Row, New York.

1885.
AMERICAN ELECTRICAL DIRECTORY.
CLOTH, 394 PAGES. PRICE, $1.50.
CONTENTS.
Electrical Societies and what they are doing.—List of Electricians in N.A.—Foreign Electricians to whom U.S. Patents were issued during 1884.—List of Electric Light Companies in N. A.—List of Gas Companies in N. A.—List of Isolated Arc and Incandescent Plants in N.A.—Patent Statistics, Electrical.—Patentable Inventions.—Patents, Electrical, issued during 1884.—List of Manufacturers of Electric Light Apparatus.—Reports from Electric Light Companies.—Reports from Telegraph Companies.—Reports from Telephone Companies.—List of Telephone Exchange Managers.—Telephone Statistics from every Exchange in the U. S.—Appendix, containing fifty pages of interesting information relating to electricity.

THE FOLLOWING ARE A FEW OF THE MANY FAVORABLE EXPRESSIONS FROM VARIOUS SOURCES WHICH HAVE COME UNSOLICITED TO OUR DESK.

A model book of the kind.—*The New Haven Electric Co., New Haven, Conn.*
It is very nicely gotten up.—*Colorado Electric Co., Denver, Col.*
I consider it a very important work.—*E.P. Thompson, M.E., New York.*
It seems to be a valuable book.—*The Arnoux Electric Co., Wilmington, Del.*
We think it is what has been wanted.—*Holmes, Booth & Haydens, New York.*
It is a valuable publication.—*Salem Electric Lighting Co., Salem, Mass.*
It will make a very convenient desk volume.—*The Brush Electric Light and Power Co. of Niagara, Niagara Falls.*
It is a valuable book and fills a want long felt.—*The Brush Electric Light Co., Buffalo, N. Y.*
It is a very useful and valuable book for reference and general information.—*Oskaloosa Gas Co., Oskaloosa, Iowa.*
It is filled with much new and useful information.—*Judge W. H. Moore, Huntsville, Ala.*
It is something that has been needed.—*Wells W. Leggett, Detroit, Mich.*
We are well pleased with it.—*Jarvis Engineering Co., Boston, Mass.*
We consider your publication a valuable one.—*The Edison Co. for Isolated Lighting, New York.*
We consider it a valuable book.—*The Minnesota Brush Electric Co., Minneapolis, Minn.*
The Directory is filled with more valuable data to those engaged in the electrical field than has ever been published in book form before.—*Electrical Review, New York.*

Copies of the AMERICAN ELECTRICAL DIRECTORY will be sent, postpaid, to any address on receipt of $1.50. Books will be sent C.O.D. to all parties ordering same, without enclosing remittance, with express and collection charges added to price of book. Address all communications to
STAR IRON TOWER COMPANY,
Fort Wayne, Ind.

PAINE & LADD,
HALBERT E. PAINE, Late Commissioner of Patents. | STORY B. LADD.
Attorneys in Patent Causes And Solicitors of Patents.
WASHINGTON, D. C.

Gonda (formerly Prism) Battery, Complete.
See that above label is on every jar

LECLANCHÉ GONDA BATTERY
(FORMERLY THE PRISM BATTERY).
THE STANDARD OPEN CIRCUIT BATTERY OF THE WORLD.

In order to protect our customers, the public and ourselves against unscrupulous piracy of our title, Prism, and its application to worthless imitations of our Battery, we have changed its name to Gonda, which is fully protected by the following
TRADE
GONDA.
MARK.
Buy none without the above Trade-Mark and the label, as shown in cut. The United States Courts have decided this label to be exclusively ours. No one else can use it.
No Battery, whether of Prism or Disque form, is genuine without both label and Trade-Mark.
The *Genuine* Leclanché Prism and Disque Cells are made *only* by us.

THE LECLANCHÉ BATTERY CO.,
149 West 18th Street, New York.

Standard ✣ Electrical ✣ Works,
MANUFACTURERS OF
TELEGRAPH AND TELEPHONE APPARATUS,
Hotel and House Annunciators, Burglar Alarms,
CALL BELLS, "POST'S" MAGNETO BELLS,
PINS and BRACKETS, BATTERIES, &c., &c.
IN STOCK:—FULL LINE
IRON, STEEL and HARD-DRAWN COPPER WIRE, Delivered at Lowest Prices.
☞ ESTIMATES FURNISHED. SEND FOR CATALOGUES AND PRICES. ☜
Cincinnati, Ohio, U. S. A.